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FOOD MANUFACTURE

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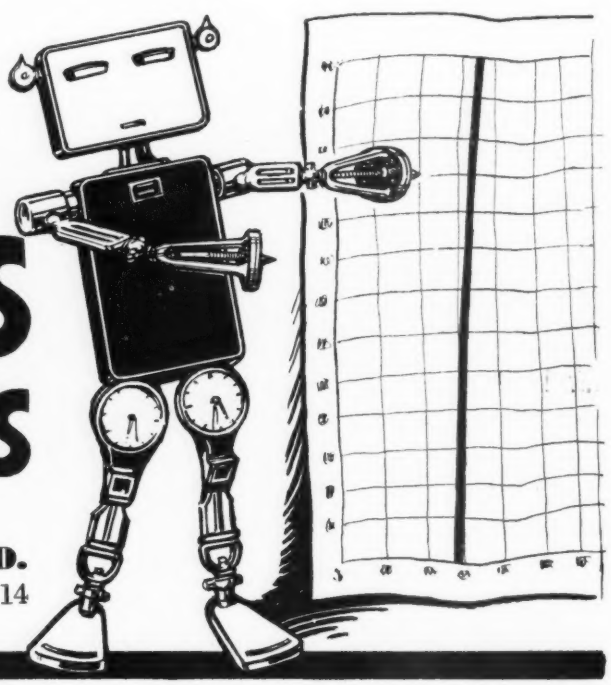

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FOOD MANUFACTURE

Vol. X, No. 6 June, 1935

Walnut Cultivation

THE RECENTLY issued Annual Report of the East Malling Research Station, Kent, contains an article on walnut propagation in England, by J. B. Hamond. It was Mr. Howard Spence, of Southport, who suggested that something might be done to improve the quality of English-grown walnuts by raising grafted trees of approved varieties. He sought the co-operation of East Malling Research Station, and the work has been carried on there for the last few years. A demonstration in walnut grafting was held at East Malling in the spring of 1934, and four nursery firms were supplied with young grafted walnut trees of approved varieties in the autumn of the same year. From this nucleus of material it is hoped that these firms will be able to build up a stock from which to obtain scion-wood, and thus to meet the demand for grafted walnut trees in England and elsewhere.

Banana Ripening

At a meeting of the Food Group of the Society of Chemical Industry, held in London on May 15, Dr. R. Gane, of the Low Temperature Research Station, Cambridge, discussed the effects of ethylene and ozone on the ripening of bananas, in the course of which the practical significance of the formation of ethylene by certain ripening fruits, as well as the scientific aspects, were briefly outlined.

The main points of the lecture are as follows: The extensive use of ethylene in fruit ripening resulted from the discovery that the efficiency of kerosene stoves used to heat the rooms was due to traces of ethylene. This has resulted in extensive trials of the effect of temperature and various concentrations of ethylene on the ripening of bananas and the colouring of citrus fruits. Propylene and acetylene are also effective, but may have to be used in higher concentrations.

Recent work at the Low Temperature Research Station has been concerned with the gaseous products of fruit metabolism, and it has been shown that in the later stages in the storage life of apples and bananas small amounts of ethylene are produced. Since unripe green bananas are ripened by very low concentrations of ethylene, the presence of some ripe fruit in the same room would cause the green fruit to ripen.

Ethylene is rapidly decomposed by ozone, and this suggests a practical method of controlling the ethylene content of the air. Excess of ozone in the air tends to retard the onset of ripening, but at the same time causes injury to the peel.

Ripening of Citrus Fruit

In this connection one may refer to some useful practical information on the ethylene ripening of citrus fruit which was given by Powell and Mathews in a publication issued by the University of Pretoria.

Four colouring rooms of about 6,000 cu. ft. are described, as well as the heating equipment and the temperature and humidity controls, and the authors suggest improvements that could be made.

Rapid and uniform colouring of citrus fruits takes place when fruit that is breaking colour is exposed to a certain concentration of ethylene gas and air (from 1 : 1,000 to 1 : 20,000), when the temperature is maintained between 70° and 80° F., and the humidity is between 85 and 95 per cent. In commercial practice a concentration of 1 : 5,000 is used, since stronger concentrations may cause injury to the fruit. Fruit should be picked according to colour, and handling with more than ordinary care is essential.

It is advisable to keep the concentration of carbon dioxide (given off by the respiratory activity) below 1 per cent., and never to let it exceed 2 per cent. When the carbon dioxide content in the colouring room reaches between 1 and 2 per cent. ventilation is necessary. The average time for ethylene colouring is fifty hours. No fruit should be packed after colouring until it has cooled down for at least twenty-four hours.

Curing of Meat

At the Food Group meeting Mr. Osman Jones briefly surveyed existing knowledge on the curing of meat, and explained that although the preservation of meat by this means dated back to prehistoric time, the complex changes that occur during the process are not yet fully understood, and much still remains obscure. He quoted as examples the causes responsible for the change in flavour from pork to bacon and the action of salt, etc.

More certain information was available about the production of the red colour of cured meat, and it was generally agreed that the statements of Polenske (1898) and Haldane (1901) were correct—namely, that the hæmoglobin of the flesh is changed to nitroso-hæmoglobin by nitric oxide; the nitric oxide having been produced by the action of bacteria upon the nitrate in the pickle.

Research work was now being carried out with the object of classifying the various bacteria which, in the presence of much salt, will reduce nitrate to nitrite, for it has been found that many of the organisms which under ordinary conditions bring about the reduction are not able to grow in strong saline solution. The matter of change of flavour and the action of salt in curing were also the subject of investigation.

Mr. Osman Jones also referred to the American and German practice of adding nitrite direct instead of having to depend on the action of bacteria on saltpetre.

Tank Pickle

As Dr. Callow stated in the F.I.B. Leaflet on Bacon Curing, tank pickle is an interesting fluid. When first prepared it contains from 23 to 28 per cent. of salt and 3 to 4 per cent. of saltpetre. When freshly prepared it is useless. It must be matured, during which micro-organisms convert some of the nitrate into nitrite. The nitrite thus formed diffuses into the meat and combines with the colouring matter of the blood (hæmoglobin) to give nitroso-hæmoglobin to which the characteristic colour of the cured product is due. For this purpose the amount of nitrite required is surprisingly small; perfectly cured bacon contains only about 300 parts per million. And in the tank-pickle itself Dr. Callow found only about 500 parts per million. Much more gives a bad colour to the meat. Apparently the maximum amount permitted in U.S.A. is 200 parts per million and in Germany 250 parts per million—at least these were the amounts mentioned during the discussion which followed Osman Jones' paper.

Dr. Callow states that "In the U.S.A. most curers actually add a little nitrite to the ingredients of the pickle. In this country the direct addition of nitrite to pickles or salt mixtures is illegal."

Official Reticence

At various times during the past four years we have asked for some explanation of this attitude on the part of the authorities in this country in prohibiting the direct use of nitrite, but none has ever been forthcoming. Why, we are at a complete loss to imagine. Surely it cannot be based upon mere prejudice? There must be some cogent reason behind it all, and it would seem both reasonable and natural to press for a frank declaration of this reason. In fact, the industry is entitled to have it. The position as it stands is deplorably vague and unsatisfactory, and requires clearing up without any further delay.

If the objection is based on grounds of possible injury to health, and it is difficult to imagine any other reason, the position is rather absurd in face of the fact that nitrite enters into the body of the meat whether it is added direct or is formed indirectly by the tank flora. Apart from the limits imposed by considerations of colour, and, in the case of U.S.A. and Germany, the restrictions governing the amount of nitrite which may be added, there have been, as Mr. T. Crosbie Walsh pointed out in this journal in February, 1932, many thousands of cases of preserved meats directly cured with nitrite imported into and consumed in this country. So where are we? Perhaps some of our readers will help us out of this irritating dilemma?

A Proposition

Direct addition of nitrite would, presumably, benefit the manufacturer in several ways. It would permit a more uniform cure under better control than is possible when one has to depend on the vagaries of micro-organisms (and we know very little about the flora of pickle). It would also simplify and shorten the process of curing. It is true that the question of flavour development must not be overlooked, but if there is any pitfall here one would expect that it would not have passed unnoticed by the Americans or Germans.

If the reader will turn up the November, 1931, issue he will find the following proposition put forward by J. W. Black, B.Sc., F.I.C., which is worth repetition here:

"The addition of nitrite to foodstuffs as a preservative in quantities sufficient for this object is contrary to the purpose and intention of the Pre-

servatives Regulations of 1925. These Regulations, however, were not intended to operate in restraint of reasonable modifications of approved existing processes, such as the substitution of nitrite for saltpetre in the curing of meats."

It would be interesting to have readers' views on the question of carrying this a stage further.

Milk Clotting

Another paper presented at the Food Group meeting, which evoked much discussion, was one by Dr. J. W. Corran on Practical Aspects of Milk Clotting. This paper was devoted to a consideration of the well-known phenomenon that cow's milk, under the influence of rennin or the pepsin of gastric juice, forms a solid clot, whereas human milk, in similar circumstances, does not.

The higher casein content of cow's milk is undoubtedly the chief cause of this behaviour, though minor differences in constitution also operate. "Clotting" and "curdling" are frequently confused terms, the second referring merely to the precipitation of casein at the isoelectric point when acid is added to milk, while true clotting is an irreversible change produced by the conversion of calcium casein to insoluble calcium paracasein through enzyme action. The predominance of clotting over curdling *in vivo* is ascribed to the environmental conditions of the stomach favouring the course of the former process.

Milk clots are doubly undesirable in the stomach, their tough, leathery nature rendering the interior portion almost inaccessible to the gastric juice, and the surface area available to the latter being reduced to a minimum.

Essential factors in clot formation are, presence of rennin or pepsin, presence of calcium, and *p*H. Clotting takes place most readily in acid solutions, and is practically inhibited by an alkaline reaction. Calcium must be present for clotting to take place, and the presence of acid liberates free ionic calcium for the purpose. Nevertheless, in spite of the above considerations, rendering the milk alkaline is no practical preventative of clotting, since in alkaline solution normal gastric digestion cannot proceed.

Various organic protective anti-clotting agents have been suggested by workers on this subject, but most of these have been found disadvantageous for one reason or another.

Breaking up the Clot

Experiments carried out by the lecturer on the clotting of milks modified in different ways were then described, with lantern-slide illustrations. The findings may be summarised as follows:

The clot formed from raw cow's milk is slightly loosened when the milk is previously boiled; sodium citrate causes only slight modification of the clot, and has the disadvantage of increasing the buffer value of the milk; gelatin renders the clot tougher rather than otherwise; malto-dextrins have a negligible action. Cereal flours, such as barley flour, alone act definitely on the clot, breaking it up to a finely divided state. This is attributed to the colloidal protective action of the starch.

It was emphasised that all the statements and experiments were concerned with liquid milk, since it is well known that in dried milks the casein is robbed of its clotting power by the process of drying.

Milk Pasteurising Plants

About the middle of last month the Ministry of Health issued Report No. 77, entitled *The Supervision of Milk Pasteurising Plants*, by Sir Weldon Dalrymple-Champneys (price 1s. 3d. H.M. Stationery Office), which discusses the principles applicable to any type of pasteurising plant devised to fulfil the requirements of the Order of 1923, which provides for the licensing of dealers selling such milk and for their supervision by the Licensing Authority.

It is claimed by the Ministry of Health that this practice of pasteurisation not only improves the keeping qualities of the milk, but if properly carried out destroys any pathogenic organisms in the milk while preserving as far as possible its nutritional value. In this connection the reader will be interested in some notes given below on the work of Dr. Fearis.

The Ministry notes that although the requirements of the Order are simple—essentially it is a matter of heating the milk to 145°-150° F. and holding at that temperature for half an hour—pasteurisation is often carried out inefficiently. Thus it was recommended that the process should only be permitted in plants of approved design inspected and tested by an officer of the sanitary authority.

The present report gives the information needed by such an officer, but it is also extremely useful to members of the trade. It is the outcome of many years of careful study of a highly technical subject, but the results of this work have been presented in a very readable and readily understandable form. Without doubt it is to be regarded as the authoritative work on the subject from the public health standpoint and as such forms an indispensable

handbook for inspecting officers and others interested in milk distribution. It should do much to raise the standard of pasteurisation in this country.

Pasteurised Milk

In view of the inquiry to be conducted by the Milk Marketing Board into the relative values of raw and pasteurised milk to which we referred in these notes last month, considerable interest attaches itself to a recent letter from Dr. Fearis to the *Lancet*. In it attention is directed to certain points which urgently need thorough investigation. First there is the question of the destruction by pasteurisation of the lactic acid bacteria—*Streptococcus lacticus*—which are the natural antiseptic agents in raw milk. Then there is the practical risk of transmission of diseases caused by pathogenic bacteria as a consequence of these bacteria gaining access to pasteurised milk in which the natural antiseptic agents have been destroyed by pasteurisation. Finally there is the effect on the resistance of man and animals against pathogenic bacteria owing to the consumption of pasteurised milk in which the lactic bacteria have been destroyed.

Important Conclusions

These are very important points, and Dr. Fearis has done a public service in calling attention to them. It is a commonplace that the growth and multiplication of pathogenic micro-organisms are inhibited by markedly acid media. This is particularly so with some strains of *B. tuberculosis* of bovine type. Furthermore, pasteurisation does not destroy the spores of *B. mesentericus* and *B. subtilis*, which cause acute intestinal toxæmia in infants. These bacteria, however, become inert in an acid medium such as is found in the normal alimentary canal of an infant. The lactic acid bacteria, therefore, tend to inhibit the growth of pathogenic bacteria, and as pasteurisation destroys these the process tends to assist the development of such organisms. It may be that pasteurisation does more harm than good; at present we do not know. The proposed investigation should be directed to throw some light on the subject. It is essential that the part played by the lactic bacteria in raw milk in the prevention of diseases caused by pathogenic organisms should be considered in order to find out the risks that are likely to ensue from the consumption of pasteurised milk.

Diminution of Oxygen

Another interesting point arising out of the problem is to what extent the oxygen present in raw milk is diminished by pasteurisation. It would also be interesting to learn what effect on general health and, especially, the resistance to pathogenic organisms is likely to result from the consumption of pasteurised milk containing less oxygen than raw milk. Milk rich in oxygen has been found to have a beneficial action on digestion, and Stephens has proved it to be beneficial in cases of anæmia, debility and insomnia. As Fearis points out, since milk rich in oxygen has such a good effect on the blood it is highly probable that fresh, unheated milk of known good quality and containing considerable oxygen will be found to be a much more efficient agent than pasteurised milk deficient in oxygen for providing natural immunity against diseases in man and in animals. If the investigations proposed by the Government are directed to the elucidation of the above and other similar problems some good may come of it, but the difficulty, as we pointed out last month, will be to get all other factors standard with milk the only variable; in other words, have every other factor identical but in one case to give raw and the other pasteurised milk. Such a state is, to our mind, wellnigh impossible.

Russia for Potatoes!

We gather from a paper by J. M. Bukasov, extracts of which appeared in a recent issue of *The Countryman*, that more than half of the potatoes grown in the world are grown in Russia. Russia is carrying out in her own way far more investigations than is generally known. M. Bukasov was sent to Guatemala, Mexico and Colombia to investigate the possibility of acquiring new species—not varieties—of potato. Further expeditions were sent to Peru, Bolivia, Chile and Ecuador and some astonishing results were obtained. M. Bukasov collected over 5,000 species, and potatoes were discovered growing at extreme elevations over a total latitude of 60 degrees. Species were found in tropical valleys and others at exposed and frost-bound altitudes. The rainfall in all the native potato fields varied extremely and everywhere different species had been cultivated for centuries. We, in our ignorance, had assumed that the potato was a single species! The possibilities arising out of these investigations are enormous. Hybridisation may well lead to the development of frost resistant commercial varieties, and that in itself would be a boon to all growers and make an earlier crop possible in this country. Congratulations to the Russians on their painstaking enterprise in this interesting direction.

COLOURS *for* FOODSTUFFS

By A. G. Kay

THE USE of harmless edible colours has become so general and the wide range of products in which they are used so varied that it is very difficult to name many manufactured foods which are not artificially coloured. It is, however, surprising how little is known of the properties of these harmless foodstuff colours by the people by whom they are employed, and it is with the object of assisting users of foodstuff colours in arriving at a correct decision as to the colour to be employed with a given food product that these notes are written.

Foodstuffs must be made to appeal to the consumer if they are to be of any value to him, and unless they do so appeal they will be of no value at all to the manufacturer. Produce a foodstuff of the finest food value, but of a dirty grey colour, and the demand for it will neither exist nor can it be created; but for the same article with a really appetising appearance there will be an entirely different reception.

Colours, therefore, should be primarily selected for their appealing result in foodstuffs, and any attempt to revolutionise the generally accepted conception of the appearance of a foodstuff should be assiduously avoided. For instance, the generally accepted shade of vinegar is brown (it may vary from a yellow shade to a red shade), and to colour vinegar blue would not appeal to the user in general, while to colour peas brown instead of green would be equally futile.

Points to Consider

Before selecting a colour for a particular food product, when once the particular shade desired has been decided upon, the manufacturer should consider carefully the nature of his product and the reactions, if any, which the colour will be called upon to withstand. If the food is acid in nature, even only slightly, an acid-proof colour must be employed and, of course, should the food be alkaline, then an alkaline-resisting colour must be used. Then again, certain food products are subjected to SO_2 in processing, and colours used with these products must accordingly withstand the action of SO_2. Further, the question of the processing through which the food product passes must be considered—*i.e.*, whether a high temperature is employed and so on.

Making the Solution

Most of the colours used in colouring foodstuffs are soluble in water, although some of them are soluble in fats and oils. Generally the colours are in powder form, but some are supplied in crystals. The best method of dissolving water-soluble colours is to place the powder in a receptacle large enough to contain the resulting solution and then slowly pour hot water (it need not be boiling) upon the powder and stir thoroughly the whole time. Some users prefer to paste up the colours by adding just sufficient water to the powder to form a thin paste, then beating up thoroughly, and finally adding the balance of water, but this is not really necessary if proper care is taken in dissolving. Every care should be exercised to obtain complete solution, otherwise undissolved particles of colour will remain in suspension and when added to food products will cause "spotting". The solutions should be filtered if there is any doubt regarding complete solubility, but generally speaking, provided care is exercised and no attempts are made to supersaturate the solution, the colours will be found quite easily soluble. This question of supersaturation deserves special mention. Frequently one comes across cases where, in an attempt to obtain a deeper shade of a given colour, additional colouring material has been added to the solution, and then it is found that a heavy deposit is the result. This is due to the fact that the saturation point of the water has been exceeded and all colour above that saturation point is merely deposited. If a deeper shade than can normally be obtained with a given colouring matter is required, do not add more and more colour, but obtain a colour of a naturally deeper shade to commence with.

Selection of Colours

It is not possible to lay down any hard and fast rules as to the colours to be employed with different foods, but those suggested in the following notes have been found generally satisfactory by the trade as a result of many years of experience.

Meat Pastes.—These are usually coloured with mixtures of Scarlet 2RW (Ponceau) and Carmoisine or, where particularly bright shades are wanted, Purified Rhodamine. The colours are dissolved and added to the bulk in process.

Fish Pastes.—Apart from bloater paste, for which a mixture of Golden Brown Y. and Purified Nigrosine should be employed, most fish pastes are of a bright pink shade, and the colours used are Purified Rhodamine and Scarlet 2RW (Ponceau). Variations are obtained by the addition of Orange II to the matter, and, if a dulling agent is required, then a trace of Purified Nigrosine can be employed.

Fish Sauces, such as anchovy sauce, etc., are generally slightly acid, and care should be taken that the colours employed withstand this. The writer came across a case recently where a colour was being used in a sauce, and it was discovered that one of the ingredients of this colour was precipitated by the slight acidity of the sauce and was

of no colour value whatever. Another point to remember is that organic action sometimes takes place, and this may cause discoloration. Acid Red 67523 (Acid Red B) is most satisfactory in this case, and variations can be made by the addition of Orange II or Orange C.E.N.

Sausages.—These are generally given a richer tone by the addition of a solution of Scarlet R.F. or by the use of coloured meal. Only a small quantity is required, otherwise the sausages will look very artificial. Ponceau 3R. is also employed, but, where sulphur dioxide is employed as a preservative, Acid Red 67523 is much more satisfactory.

Polonies.—In order to colour the skins of these, reds such as Polony Red C.R. and Scarlet 4B. are used. It is essential that the colour should not penetrate the skin and so colour the inside of the polony, and it has been found that these colours satisfactorily meet this specification.

Rusks.—Bread rusks are used very considerably in the manufacture of many food products, and these are coloured according to ultimate requirements. For brown rusks mixtures of Golden Brown Y., Carmoisine, and Nigrosine are recommended. For pink rusks Rhodamine or Scarlet 2RW (used weak) will be found satisfactory, and for yellow or golden shades Tartrazol Yellow (Tartrazine), Orange II, Golden Brown Y., and also mixtures of these three will be found to produce good shades.

Black Pudding.—For this, Purified Nigrosine is generally employed.

Vinegar can be coloured with Caramel or Caramel Substitute, variations in shade being obtained by the quantity of colour added, but usually only a very small percentage is employed. Any risk of precipitation in vinegar is a danger to be strictly avoided.

Sauces.—For brown sauces Caramel or Caramel Substitute is usually employed, and for red or pink sauces the colours in general demand are mixtures of Ponceau 2RW., Scarlet 67523, and Orange C.E.N.

Pickles.—For mustard pickles, Tartrazol Yellow and Orange II are quite satisfactory, and for red cabbage Azo Rubine is sometimes employed. For brown pickles Caramel or Caramel Substitute would be satisfactory.

Cakes, Biscuits, etc.—Most cakes and biscuits are coloured, as, of course, a rich egg shade is demanded in these products. Mixtures of Tartrazol Yellow and Orange II are chiefly employed.

Egg Powders and Custard Powders.—The colouring matters generally used here are Tartrazol Yellow shaded with Orange II or Pure Orange G. In some instances the colours are dissolved and sprayed over the other ingredients, afterwards drying off and grinding, but in other cases the colours are ground in dry with the powders, in which case very finely divided colours must be employed.

Blanc Mange Powders.—These are sold in various shades, and the following produce satisfactory results:

For Cherry Shade	Carmoisine or Ponceau 4R.
,, Raspberry ..	Amaranth.
,, Strawberry ..	Ponceau.
,, Lemon ..	Tartrazol Yellow.
,, Orange ..	Orange II or Acid Orange G.
,, Vanilla ..	Tartrazol Yellow shaded with Orange.

Mineral Waters.—Only acid-proof colours, free from risk of precipitation, should be employed here, and it is essential that the colours should produce bright clear shades and not be dull or muddy. Tartrazol Yellow, Acid Orange G., Amaranth, Carmoisine, Ponceau 4R., Ponceau 2RW., Caramel Substitute, and Golden Brown Y. cover the usual colours required, and these can be intermixed to give variations of shades. Every care must be taken to avoid undissolved particles in the solutions, and it is as well to allow the colour solutions to remain standing for some time before use and then decant rather than run any risk of deposit.

Jellies.—In colouring these care should be taken to ensure that the products are neutral. Bright colours such as Ponceau 2R., 4R., and 6R., Tartrazol Yellow, Acid Orange G., Acid Orange C.E.N., Amaranth, Carmoisine, Acid Bordeaux B., and Lime Yellow are all satisfactory.

Lemonade and Orangeade Crystals.—For these the writer suggests Tartrazol Yellow, possibly shaded with Orange II and Acid Orange C.E.N.

★ ★ ★

VITAMIN STANDARDS

Nature reports that the International Standards for vitamins A, B_1, C, and D are now available for issue to laboratories, institutions, and research workers in Great Britain and Northern Ireland. These standards were accepted for international use at the Second International Conference on Vitamin Standardisation held in London in June, 1934, under the auspices of the Permanent Commission on Biological Standardisation of the Health Organisation of the League of Nations. The Conference recommended that they should be kept at the National Institute for Medical Research, Hampstead, N.W. 3, which would act for this purpose as the central laboratory on behalf of the Health Organisation of the League of Nations. The standards for the vitamins B_1 and D remain unchanged, and their supply at regular half-yearly intervals will be continued as before. The standard for vitamin A has been changed, a pure specimen of β-carotene having been adopted in place of the impure preparation of carotene hitherto employed. The unit of vitamin A remains unchanged, though it is now defined as the vitamin A activity contained in 0·6 microgram of pure β-carotene. In accordance with the recommendations of the Conference, the β-carotene is issued in the form of a solution in oil, of which 1 gm. contains 500 international units. The quantity of this standard solution supplied to each applicant is approximately 5 gm., and, on account of the small quantity available, it can be supplied only at yearly intervals, and not half-yearly, as formerly. *l*-Ascorbic acid has been adopted as the international standard for vitamin C, the unit of activity being defined as the vitamin C activity contained in 0·5 mgm. of pure *l*-ascorbic acid.

The FLAVOURING of FOODSTUFFS

By Harold Morgan, M.Sc.

A Vanilla Bed, Rarotonga, Pacific Isles.

THE PART played by flavourings in the various foodstuffs industries is really impressive. I doubt if many regular users of flavours ever realise the infinite variety of substances which are solely employed for the purpose of giving a foodstuff an attractive taste or for modifying in some way or another the natural flavour of the food itself. And yet, in this country in many ways we are backward in the art of flavouring as practised even by our nearest Continental neighbours. After some years of dealing with flavours in the course of my professional work, the whole subject still appears so vast that one's accumulated experience can cover only a fraction of the possibilities.

It is not entirely that the number of possible flavouring materials is infinitely large, but the possible combinations are innumerable. The foodstuffs industry covers a large range of products, and each line can be flavoured in many ways, involving a careful study of blending suitable materials as well as of the best methods of handling them and incorporating them in the particular food.

To classify flavours adequately is impossible, because some materials, which are themselves food and are used as such, may be added to other foods, not from a dietetic standpoint, but merely as a flavouring ingredient. However, the materials commonly regarded as flavours can be grouped to some extent, and such a classification includes essential oils derived from fruits, spices, etc., expressed oils from certain nuts and spices, natural fruit extracts and juices, spices, herbs and vegetable bodies, and synthetic flavours. Further subdivision includes terpeneless and sesquiterpeneless oils and natural products fortified by the addition of synthetics.

Essential Oil Type

Taking first the essential oil type of flavour, certain precautions must be observed and the fundamental nature of the oils realised in order to utilise them to the best advantage. The ordinary essential oils require cool or at most temperate storage, away from direct sunlight and protected from atmospheric oxidation. Well-stoppered dark-coloured bottles provide a good form of packing.

The effect of air and light on these oils depends on their constituents. Oxidation takes place with comparative ease, as also do photochemical changes. Citrus oils soon develop a terpene flavour under bad storage conditions, while the characteristics of spice oils will become entirely changed.

Though essential oils in their raw state are not as susceptible to high temperatures as are some other flavours (*e.g.*, alcoholic solutions, etc.), they must not be exposed to process heat any longer than is absolutely necessary. For instance, if spice oils are used in sauce manufacture they should be added towards the end of the boiling process. In high-boiled confectionery, where a temperature of 310° F. may be reached, the flavouring oils must be added at the last possible moment before pitching on to the slab, but wherever possible should be worked in on the slab. Even with these precautions a certain amount of flavour will be lost because the essential flavouring portions of the oil are volatile at such temperatures. In order to gauge the real value of an oil a sample must be tested under actual factory conditions.

Practical testing in the process in which the oil is to

be used is the best method of evaluating samples when considering fresh purchases. Chemical tests certainly give some information, but natural variations of oil constants are too wide and analytical procedure insufficiently advanced to enable a laboratory report to be formulated which will fully assess the value of an oil and its behaviour under actual factory conditions.

Price is a poor criterion by which to judge essential oils. I am fully aware of the importance of keeping as low as possible material costs in the factory, but in the purchase of essential oils quality must come first and price second. I have on many occasions come across buyers congratulating themselves on a cheap purchase and never realising that, owing to weakness or inferior quality of the purchase, amounts even up to 20 per cent. in excess of the usual doses were being used in the factory.

Terpeneless Oils

Terpeneless and sesquiterpeneless oils, as their names imply, are essential oils minus the terpenes and sesquiterpenes. They contain the flavouring ingredients of the oil in a very concentrated form, and the high price of most of these will be appreciated when it is realised that terpenes often compose up to 99 per cent. of the raw oil. Terpeneless oils are volatile, so they must not be exposed unduly to process heat. They have a good solubility in comparatively weak spirit and give a clear solution which does not cloud on dilution with syrup. Hence this type of oil is valuable in the mineral water industry as well as in other industries, where its more delicate flavour, as compared with the ordinary raw oil, is appreciated.

Considerable emphasis sometimes is laid on the assertion that the terpeneless oil contains the whole of the flavouring constituents of the oil, the removed terpenes being valueless. While there is a considerable amount of truth in the claim, I am of the opinion that the terpenes do assist in giving a valuable background to the oil and produce a fuller flavour.

Spice Oils

Herbs, spices, and condiments are now being increasingly replaced by the appropriate oils. This is quite reasonable when it is remembered that in some cases 99·5 per cent. or so of the added dried spice is merely fibrous and vegetable matter which has no flavouring power and often detracts from the appearance of the product. I find

(By courtesy of the West India Committee.)

A Nutmeg Tree.

that a certain amount of difficulty is experienced by many users, or would-be users, owing to the extreme strength of these oils compared with the plant products. In the meat industry, for example, it certainly is somewhat revolutionary in factory methods to handle fractions of a drachm of oil in place of pounds of seasonings. It is better in such cases to dilute the oil and measure out large quantities of the weakened flavours. By suitably adjusting the various concentrations a certain proportion can be arranged between the diluted oil flavour and the previously used dried product. It must be remembered that materials such as ginger, pepper, and cayenne are used for their pungency properties as well as for aroma. In these cases the respective oleo-resins, suitably diluted, must be used, and not their essential oils. Expressed, or what are also termed fixed, oils and fat are pressed out and are not volatile in steam in contradistinction to the essential oils. The remarks on storage apply here with advantage, especially with regard to protection from air. In the group are included oils and fats which can become rancid under the influence of air and light.

Fruit Extracts

The next class to be mentioned is that of fruit extracts and juices. The former are usually in a concentrated form, of syrupy consistency, and may contain added sugar. Often they are disappointing in flavour, due to inherent weakness or to loss during concentration. They have specific use in jellies, soda fountain syrups, etc., but are not economical for boiled confections, as heat affects the flavour and too much would be required to produce a satisfactory taste. The comparatively high acid content of extracts and juices must be borne in mind when considering their application. Work has commenced and will be continued during the coming season on the concentration of juice under a vacuum, and certain modifications now in the experimental stage promise considerable improvement in these juices from the flavour point of view.

Fruit Juices

Ordinary fruit juices, especially those of the citrus variety, have become exceedingly popular in beverages. Not being concentrated, they have poor keeping qualities unless chemically preserved or pasteurised. English fruit juice drinks have been overshadowed by those incorporating imported juices from fruits which are not grown here, but I hope we shall be able to develop soon drinks made from juices of home-grown fruits.

All these juices must be handled with care, remembering that they depend for keeping quality on added sulphur dioxide (or possibly benzoic acid). As the gas comes away under heat, the juices must be stored in a cool place. The preservative also easily oxidises, and so air must be excluded as far as possible. Do not leave partly filled pipes or barrels lying about: rather transfer the remaining juice and pulp to smaller containers which can be filled completely and sealed.

Reference has been made to the increasing use of oil in place of dry seasonings. As far as the latter are concerned, not many points arise. Moisture content is important, as these goods are bought on weight, and a little extra dampness is not visibly apparent. Adulteration requires careful examination and microscopical inspection.

Synthetics

The weakness of certain natural flavouring products gave rise to the preparation of flavours composed entirely of synthetics and to the use of chemicals to fortify the naturally occurring flavouring principles. By this means stronger flavours are obtained and a smaller dose wanted to give the desired taste. These latter compound flavours, as they are termed, are of considerable benefit for goods which are manufactured at high temperatures. Great care is necessary in the use of these chemicals, and expert blending is required to obtain flavours which really do simulate the flavour of the product they represent. Occasionally chemicals are produced which, both in taste and odour, obviously represent the flavour and odour of a natural product—*e.g.*, the chemicals in synthetic pineapple essence—but often a synthetic must be tried out under factory conditions to assess its worth to the manufacturer. Smell is no guide, and if the process involves heating, then the effect of temperature on the essence must be ascertained.

Solvents play an important part in the preparation of flavours, and while alcohol is undoubtedly the best, the duty surcharge raises the cost of spirituous flavours. Other solvents have been introduced in recent years, and, as a substitute for alcohol, compounds of glycol ether types are useful. There is a practical point which manufacturers should consider with regard to these higher boiling substitutes. They are not so prone to evaporate and carry away some of the dissolved flavour as do the spirituous essences.

New Flavours

The combination of flavours is a matter to which much greater attention should be paid. There is no reason why a user in one industry should not notice the flavours which are popular in another and endeavour to introduce new blends as a result of such observations. The constant cry of manufacturers, as a result of public demand, is for new lines. But the evolution of really original foodstuffs is becoming difficult owing to the multiplicity of goods already on the market. Creation of new flavour blends will go a long way to satisfy such requirements.

The comparatively low cost of flavouring ingredients in relation to the bulk materials of a manufactured food tends to their importance being overlooked by the manufacturer who is satisfied so long as no change in the standard of taste is made. The maintenance of a particular standardised flavour in a line is essential once the line is on the market, but the public taste is catholic and ever changing, and the wise manufacturer is always working on the preparation of better and brighter flavours for future productions.

MODERN CONFECTIONERY FLAVOURS

BY FRANK H. SEDGWICK

AMONG FOOD manufacturers generally it is not uncommon to find a certain amount of confusion prevalent as to the type and constitution of different flavouring materials. The present article is an attempt to classify confectionery flavours, and is intended more as a practical guide than as an inducement to compound one's own essences. Most of the well-known flavourings, in fact, are the result of considerable specialised research and skill in blending, for to obtain a really satisfactory product it is necessary to combine the requisite knowledge with a high degree of artistry and discrimination.

Confectionery flavours may conveniently be divided into the following main groups:

(*a*) Natural fruit extracts, consisting of concentrated juices prepared solely from the fruit or natural product, and carefully preserved;
(*b*) natural extracts fortified with added essential oils and synthetics, or synthetic extracts improved by the addition of a little fruit juice;
(*c*) wholly synthetic flavours; and
(*d*) essential oils, plain or terpeneless, in alcoholic solution.

The foregoing are also capable of division into such categories as paste flavours, dry powder flavours, etc., according both to the product in which they are to be used and whatever price considerations govern its manufacture.

Fruit Juices

The first group, consisting of concentrated fruit juices, plays an important part in the production of high-class flavours. Being expensive to prepare, however, as well as lacking in "body" or covering power, they are most frequently employed to "round off" the finished flavour rather than on account of their intrinsic taste. Their preparation is carried out in a number of ways, the most common of which involves the crushing of the fruit between stone rollers. Alternatively, as in the case of apples, the fruit may be ground in a grater mill and the resulting pulp subjected to considerable pressure in a hydraulic press.

In most instances the fruit is allowed to undergo gentle fermentation for a few days, this procedure helping at one and the same time to ensure the necessary pulpy consistency and to clarify the resulting juice by the part precipitation of pectin. Small quantities of sugar are occasionally added to aid the fermenting process. Filtration may be carried out with a pulp filter, as used in cider-making, while concentration is effected by the vacuum distillation method, the first fraction (a most important one) being replaced in the still together with the residual liquid. The ideal, of course, to be aimed at is the production of a clear, unspoilt liquid that will keep almost indefinitely. The application of too much heat must therefore be avoided if the true flavour of the fruit is to be preserved intact. Preservation is carried out with the aid of the permitted preservatives (in this case, sulphur dioxide or benzoic acid). Moreover, the time is probably not far distant when the employment as preservatives of the esters of parahydroxybenzoic acid will be sanctioned in this country, as is even now the case in Germany.

According to F. S. Tzerevitinov, the slow clarification of fruit and berry juices is caused by pectase, which precipitates pectic acid from the pectin in the juice. Hence the clarification can be accelerated by adding pectase, a pectase extract of leaves from clover, potato, or lucerne being effective. Thus if 0·1 per cent. of pectase (as expressed juice from the leaves) is added, complete clarification occurs within six days, whereas without added pectase as long as six months may be required. The optimum *p*H varies according to the kind of juice, being well on the basic side in cider, and quite acid (3·3) in raspberry juice.

Montserrat Limes.

Gathering Orange Blossoms near Grasse.

Fruit syrups are prepared along similar lines to the above, 65 per cent. sugar content giving a syrup that keeps perfectly. Such a high percentage naturally brings about a dilution of the flavour, but although syrups of a lower sugar content can be made much more realistic, they are correspondingly prone to the growth of moulds, yeasts, and other micro-organisms.

Artificial Flavours

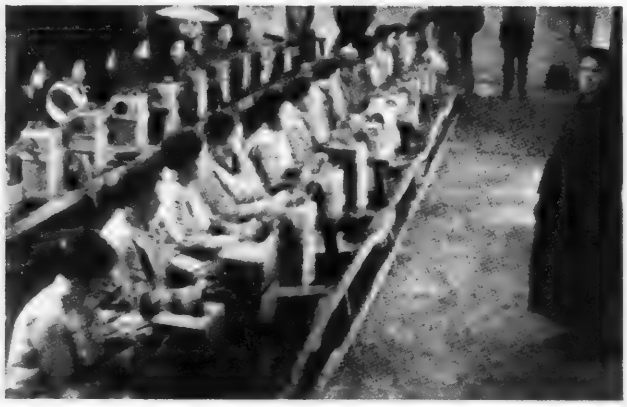
The majority of confectionery flavours are, as we have seen, compounded largely on a basis of synthetics, modified and improved by additions of fruit concentrates, as described above. The preparation of these products is a matter for considerable technical skill, more particularly as the bulk of the literature on the subject, owing to modern developments in raw materials, has become rather outdated. The work of Kletzinski and Wittstein, for example, suffers greatly by comparison with contemporary standards, in addition to which a good many of their oft-quoted formulæ have been proved by experience to be unworkable.

When compounding artificial flavours it is usually necessary to give added emphasis and sweetness by the inclusion of vanillin or coumarin, often in association with a sharp-tasting organic acid. The ideal solvent for all soluble essences is, of course, 90 per cent. alcohol, but in this connection isopropyl alcohol, diacetin, ethylene glycol and its esters are also employed. Glycerin is nowadays used chiefly as a sweetening agent.

The following table, collated from several different sources, demonstrates the application of the commoner synthetics in a number of artificial fruit flavours:

Synthetics.	*Fruit Flavours.*
Acetaldehyde	apple, banana, peach, plum.
Amyl acetate	apple, banana, pear, strawberry.
Amyl butyrate	apricot, cherry, pineapple, strawberry.
Amyl formate	cherry, gooseberry, peach, strawberry.
Amyl valerianate ...	apple, apricot, banana, strawberry.
Benzaldehyde	apricot, cherry, peach, plum.
Chloroform	apple, apricot, banana, pineapple.
Ethyl acetate	apple, cherry, gooseberry, peach, pear, plum.
Ethyl benzoate	blackberry, blackcurrant, cherry, gooseberry.
Ethyl butyrate	banana, cherry, gooseberry, peach, pineapple.
Ethyl formate	peach, plum, raspberry.
Ethyl nitrite	apple, pear, raspberry, strawberry.
Ethyl oenanthate ...	apricot, peach, plum.
Ethyl sebacate	banana, melon.
Ethyl valerianate ...	apricot, melon, peach.
Ethyl phenyl glycidate	pineapple, strawberry.
Eugenol	cherry, pear, plum, raspberry.
Gamma undecalactone	apricot, cherry, peach.
Ionone alpha	cherry, raspberry.
Isobutyl acetate ...	raspberry.
Methyl ionone	blackberry.
Methyl salicylate ...	blackberry, pear, raspberry.
Propyl valerianate ...	pineapple.

Carvone, on account of its fine caraway-like odour, is to be recommended for use in flavours of the Kümmel type. In the compounding of raspberry flavours ionone is



Separating the Peel from Oranges.
(*Felix Gutkind, Malaga.*)

employed successfully in conjunction with tincture of orris. Excessive use of benzyl acetate for flavouring purposes (banana, apricot, etc.) must be avoided, owing to the tendency of this substance to cause irritation of the palate. It should be noted that a useful raspberry composition may be built up on a basis of pear flavour, chloroform, ethyl acetate, isobutyl acetate, tincture of orris, ionone—improved by small additions of the following essences: rose, lemon, and Portugal. The resulting compound may be further improved by the incorporation of a little concentrated raspberry juice.

Fruit flavours are usually coloured according to type, either with a harmless synthetic dyestuff or with such natural products as saffron or turmeric (in the case of yellow), caramel for brown, and cudbear, cochineal or carmine for the various shades of red.

Special flavours for confectionery purposes, manufactured according to the procedure previously outlined, are obtainable in several convenient forms, including paste flavours, dry powder flavours, non-alcoholic fruit oils and essences, jelly flavours, and oil- and fat-soluble flavours. The powders have the advantage of being soluble, free from alcohol, and easily stored. They are frequently prepared by incorporating the finished essence in a basis of dextrin or gum mucilage, with subsequent drying at a moderate temperature.

Flavouring extracts in paste form, put up in collapsible tubes, are becoming increasingly popular in America among the general public, and there seems no reason why they should not eventually be brought into favour in this country. They are prepared by embodying the flavour proper in glucose of a fairly high specific gravity.

While on this subject, mention should be made of that most useful stock article—vanillin sugar. This is made by dissolving an ounce of vanillin crystals in four ounces or so of alcohol, subsequently stirring and mixing the solution intimately into the desired quantity of finely powdered white sugar. The mixture is then allowed to dry for a night in the open air, after which it is sifted and stored in bottles for future use. The amount of sugar naturally varies according to taste, Whymper recommending 13 lb., which would seem to err a little on the side of excess.

Simple Essences

The more straightforward essences are not to be regarded, in most cases, as complete flavours in themselves, but rather as stock solutions from which the finished products may in part be prepared. Actually they consist of nothing more nor less than alcoholic tinctures of the various essential oils, and as such they improve, in general, with age. In the case of lemon essence, for example, they also help to preserve the essential oil, as well as keeping it readily available in a convenient form.

The agreed standards of the U.S. Board of Agriculture may be taken as providing generally acceptable specifications for all essences intended for use in confectionery flavours. Appropriately tabulated, in parts by volume per hundred, these may be expressed as follows, it being noted that the solvent in each case is ethyl alcohol and the flavourous principle the appropriate essential oil, unless otherwise stated:

Anise	3	Nutmeg	2
Bitter almond	1	Orange	5
Cassia	2	Peppermint ...	3
Cinnamon	2	Rose	0·4 of rose otto.
Clove	2	Spearmint ...	3
Lemon	5	Wintergreen ...	3

Ginger extract is given as containing, in each 100 c.c., the alcohol-soluble portion of 20 gm. of ginger. Similarly, tonka extract contains 0·1 per cent. by weight of coumarin and a corresponding proportion of the other soluble matter of the bean; and vanilla extract the soluble portion of 10 gm. of vanilla in 100 c.c. of alcohol.

Essential oils for confectionery purposes should be

Collecting Cinnamon Leaves for Distillation in the Seychelles.
(*From the Collection of the Imperial Institute.*)

Drying Cloves on Mats in Zanzibar—Clove trees in the background.
(*From the Imperial Institute Collection, South Kensington.*)

chosen with great care, though when purchased from a reliable source there is little fear nowadays of extensive adulteration. Nevertheless, such natural products are subject to considerable fluctuation, according both to the quality of the crop and the country of origin. Citrus oils for confectionery should always be hand-pressed, while lemon oil in addition should contain a high percentage of natural citral. Owing in large part to the botanical differences in the plants from which it is derived, peppermint oil from different regions always shows wide variation in chemical and physical constants, as evidenced in the work carried out by Gildemeister and Hoffman:

	Specific Gravity.	*Optical Rotn.*	*Percentage Menthol.*
American ...	0·905 to 0·920	−18° to −33°	48 to 60
English ...	0·900 to 0·910	−22° to −33°	56 to 66
Japanese ...	0·895 to 0·900	−30° to −42°	70 to 91
French ...	0·918 to 0·920	− 5° to − 9°	43 to 46
Russian ...	0·905 to 0·910	−17° to −22°	50·2

In regard to peppermint oil it should not be overlooked that the Italo-Mitcham and Palestine varieties, both of which have a very good bouquet, are now being increasingly used in all branches of confectionery.

Lemon oil adulterated with lemon terpenes, limonene or phellandrene should be avoided, as also dementholised oil of peppermint. Terpeneless oils, owing to their greatly increased solubility in dilute alcohol, possess an undoubted advantage over the ordinary oils of commerce, particularly in cases where the percentage of spirit needs to be kept to a bare minimum. Terpeneless orange oil is fairly expensive in comparison with the usual variety, but very little is necessary to impart an orange flavour, while the avoidance of a turpentine odour on aging more than compensates for the slightly increased cost.

Conclusion

In conclusion, it should be noted that, when compounding an artificial flavour, great care must be taken in the choice of ingredients, not merely from an olfactory standpoint, but with a view to avoiding as far as possible the occurrence of hydrolysis. Should this take place (as it is rather apt to in certain instances), the resulting product will after a short time be profoundly modified. As pointed out by M. C. Albrech, however (*Spice Mill*, 54, 1931), the hydrolysis of ethyl acetate, amyl acetate, ethyl benzoate, ethyl butyrate, and ethyl valerianate is practically negligible in imitation fruit extracts into which no acid has been introduced. Since most flavours contain some natural fruit juice with its accompanying acid, it is suggested that sufficient of the esters should be added to allow for some hydrolysis.

A QUESTION OF TASTE

By T. Crosbie-Walsh, F.I.C., F.C.S.

LIKE THE gentleman who, when the difference between verse and prose was explained to him, marvelled greatly at the fact that he had been talking prose all his life without knowing it, many of us eat and drink without realising what taste really is and of what complicated sensations it is composed.

It is probable that tasting has reached its apogee with reference to wines, both from the physiological and psychological standpoints. We have been reading a good deal about the shortcomings of British canners as regards crying their wares in due manner, and they might well take a leaf from the book of the clever wine-grower, who never allows a possible customer to try his wine until he has sung all its praises. In any case, it might be instructive to watch a demonstrator of pig's head brawn at an exhibition expatiating on its flavour and bouquet with the charm and picturesqueness expended upon "the goods the vintners sell".

Four Fundamental Tastes

Physiologists have reduced the fundamental tastes to four in number—sweet, bitter, acid (or sour), and salt. Other tastes, such as alkaline, metallic, etc., are mixtures of sensation. The *gourmet*—and, indeed, the more prosaic eater and drinker—would be bewildered in trying to express the varied sensations he experiences while negotiating (let us say) *La Selle d'Agneau de Pauillac*, exquisitely companioned by one of the *Grands Vins de Bordeaux*, in such unbelievably empirical terms. Nevertheless, he would be obliged so to do, were it not for the fact that the majority of his pleasure is derived not purely from taste, but from smell.

The actual sensation of taste is that produced by the stimulation of the taste buds of the tongue and adjacent tissues. Tactual elements enter into tastes—for instance, the astringent sensation produced by acids, apart from their sour taste. Connoisseurs sometimes use the tip of their tongue when first tasting wine. The tip of the tongue is not very sensitive to the acid taste, and by this means astringency and acidity may be differentiated.

Sweet and bitter tastes are freer from subsidiary effects than salt or acids. Nevertheless, if solutions of bitter or sweet substances are diluted to such an extent as to eliminate their bitterness or sweetness, they still have certain reactions, such as, in the latter case, a sensation of "fattiness".

Synthetic Tastes

Synthetic tastes may be produced. A strong solution of sugar applied to the same part of the tongue at the same time as a strong solution of salt will produce an alkaline taste, and in dilute solutions the respective tastes tend to neutralise each other, and a definite "insipid" taste is the result.

Another interesting and rather important feature of taste is the result of contrast. If strong salt is taken, followed by pure water, the sensation given by the water is that of sweetness. A very marked example of the sensation of sweetness given by water is when this is taken after eating the tips of globe artichokes.

Thus it is that in judging flavours and tastes we must come to them with suitably clean palates and also realise the importance of olfactory sensations in connection with our judgment. Smell is closely connected with taste, and what is termed taste is often really smell. For instance, we cannot differentiate between an apple and an onion by the tongue if we close our nostrils. The vapours of the various foods are carried behind

Forest Land under Peppermint at Byford, West Australia.

(By courtesy of Maxwell, Plaistowe and Co., Ltd.)

The Ginger Plant. Ginger was known to the Greeks and Romans and was used in England. In those days the supply came from India.

(By courtesy of the High Commissioner for India.)

the soft palate into the nose and are identified by the olfactory end organs.

Classification of Smells

The classification of smells is not so simple as that of taste. Zwaardemaker, in his *Die Physiologie des Geruchs*, gives an interesting list:

1. *Ethereal smells.* (*a*) Fruit ethers. (*b*) Beeswax. (*c*) Ethers, aldehydes, ketones (lower members of homologous series).

2. *Aromatic smells.* (*a*) Camphor. (*b*) Spicy smells. (*c*) Anise and lavender. (*d*) Lemon and rose. (*e*) Almond smells.

3. *Balsamic smells.* (*a*) Jasmine, ylang-ylang, orange blossom. (*b*) Lily-like smells. (*c*) Vanilla smells.

4. *Amber-musk smells.* (*a*) Amber. (*b*) Musk smells.

5. *Allyl-cacodyl smells.* (*a*) Sulphuretted hydrogen, asafœtida, and like smells. (*b*) Fishy smells. (*c*) Halogen smells.

6. *Burning smells.* (*a*) Toast, tobacco smoke, creosote, etc. (*b*) Benzol, phenol, etc.

7. *Caprylic smells.* (*a*) Caproic acid, cheese, sweat. (*b*) Cat's urine, sexual odours.

8. *Repulsive smells.* (*a*) Narcotic smells. (*b*) The smell of bugs, ozæna.

9. *Nauseating smells.* (*a*) Putrefying bodies. (*b*) Fæces, scatol.

Zwaardemaker suggests that in the olfactory apparatus there are nine groups, corresponding to the nine groups of smells, and that they are arranged in spatial order. A justification for the approximate integrity of the classification is a series of investigations in which total loss of smell was artificially and temporarily produced. During recovery of sensibility the odours remained in their particular classes, although they did not return in the order given above. For instance Class 6 returned first and Class 8 last. The investigator also attempted to ascribe the different classes to specific chemical groups.

Neutralisation of Taste

As in the case of tastes, the neutralisation of one smell by another (without any chemical reaction between the substances causing them) has been observed.

The neutralisation of tastes is taken advantage of in the preparation of sauces, pickles, preserved meats, etc. The subtle, smooth taste (or smell) of certain sauces is due to the combination of tastes and smells. The use of sugar in preserved meat, in pickle for meat, in sauces and pickles, is mainly directed towards the toning down of the salt. Saltiness is also toned down during the maturation of meats in tins. Subsidiary flavours develop in a sterile can of meat in a manner not entirely understood at the present time. These flavours are not strong, but they have the effect of masking the salt flavour to such an extent that the effect was provided for in the application of salt in the pack. When newly prepared products are tasted during routine examinations the salt taste often stands out too prominently. It is probable that in this case taste and not smell is the principal sensation, and that after the aromatic bodies have developed, when the product has matured, smell intervenes.

Many people appear to object to what they term "corned beef smell" in preserved meats. This develops with keeping, although the contents of the cans may be sterile. Experiments were made to ascertain whether the development of the characteristic smell was due to the presence of sundry organisms left alive after processing, as often happens with perfectly sound material. Special means were taken to ensure complete sterility, and the smell developed just as it did when no special precautions were taken.

*p*H value has its effect, and it is possible to produce a can of meat which will not develop—at any rate, not so readily—the particular smell. The advantage is doubtful, especially in the case of corned beef itself, as it is a taste *sui generis* and one which characterises this class of product.

Another smell which is very characteristic is that noted when an unlacquered tin of peaches is opened. This has been described independently by several people as a "tinny" smell, although they are hazy when asked about the smell of tin! It is probably due to a slight trace of acetylene.

In tasting extract of meat, highly diluted solutions are employed and the temperature carefully standardised. By such dilution unpleasant flavours would not be masked by the somewhat violent stimulation of the meat bases.

In addition to taste, smell, and subsidiary sensations, the food manufacturer has to consider another important

(*Continued on page* 203.)

Flavour Retention IN Powdered Goods

By Lionel J. Dent, B.Sc. (Lond.)

THE BASIC materials used in the production of powdered goods—sugars, starches, agglutiments, etc.—are in general almost entirely free from "flavour" in the accepted sense of the word. In this type of production, given basic materials of good standard quality properly manufactured, it is to the flavour in the large majority of cases that the product owes its character and appeal. It follows, therefore, that the incorporation and retention of flavour in the many popular commodities of this class is a matter of the most fundamental importance in their sale and consumption.

To a food technologist specialising in flavouring problems this is a field which offers unlimited scope and possibilities. Consider for a moment the extent of the products with which he may have to deal—blanc-mange and custard powder, jelly powders, lemonade and soft drink crystals, junket, table creams and other fancy mixtures for table delicacies, ice-cream powders, cake and pudding mixtures, soup powders, and so on. Each product presents its own flavouring difficulties, and only a thorough technical knowledge, coupled with experience, will allow of their solution.

Types of Flavouring Materials

The nature of the flavouring materials themselves is obviously a prime factor in determining not only the quality of the flavour, but also its keeping properties.

Materials which are in themselves solids or powders will, as one would expect, be most likely to be stable in powdered goods. It is open to question whether salt and the fruit acids can be termed flavouring materials in the sense used in this article, but they serve to illustrate the point. Powdered spices, turmeric, cocoa, etc., come under this heading, as do vanillin and its homologue ethyl vanillin—both very extensively used in the solid powder form for vanilla flavouring.

The natural essential oils are in common use in the flavouring of powders. Lemon oil is, of course, the most popular, and almost equally well known are the essential oils of orange, limes, grapefruit, almond, and of the spices, all representing the natural flavour more or less closely.

Within the limits of an article of this type it is possible only to indicate briefly the main advantages and disadvantages attending the use of these oils: They are easily handled and readily standardised, and it is possible to ensure their thorough and complete incorporation throughout the powder batch; most of them, however, are susceptible to oxidation, all the more readily on account of their fine state of subdivision in the powder, with corresponding loss of flavour, and in many cases with the development of objectionable by-flavours.

The corresponding terpeneless oils, in which some of the less stable constituents have been removed, are widely used, both alone and in blended flavours. They are markedly superior to the ordinary oils as regards their keeping properties, but used by themselves they lack the palate fullness and body of the straight run oils.

Natural pure fruit essences, if properly prepared, are fairly satisfactory, but are largely precluded on account of price. Artificial or partly artificial fruit essences are now used almost universally, and, if obtained from a good house or prepared by an expert, can be relied upon to retain their flavours over long periods, provided correct methods of incorporation and packing are used. Cheap flavours, possibly quite satisfactory in solid confections, will be found in many cases to be extremely evanescent in powdered materials, and unless the flavour is prepared actually with a view to its use in powders, it is often found that the evaporation losses, during and after incorporation, result in a complete unbalancing of the constituents, with disastrous results to the character and palatability of the flavour.

Methods of Introducing the Flavour

The method of incorporating the essence is a factor of great importance in this problem of flavour quality and stability. In a mixer of the normal open type, where the essence is added directly to the main bulk of ingredients, the whole burden of successful flavouring is thrown directly on to the essence, and a successful product can only be obtained if the stability of the essence is such as to stand up to this treatment.

In modern manufacturing, however, suitable methods of mixing enable some of the less stable materials to be used more satisfactorily. For example, almond oil in a starch base may readily lose 50 per cent. of its strength during incorporation in an open mixer, due to oxidation to benzoic acid, while by drum mixing such losses can be very considerably reduced. The introduction of the essence in the form of a fine spray is often similarly effective (mainly by reducing the mixing time) in making appreciable savings in essence.

The use of master-batch mixing in many cases is advis-

able to ensure uniform distribution. Where possible it is advantageous from the point of view of flavour retention to introduce the essence first into a portion of one of the more absorbent of the ingredients, and then finally to mix off and "dry out" with the less easily penetrated materials, such as the sugar. An important application of this principle is the use of a previously prepared or purchased powdered concentrate usually based on an absorbent soluble material such as dextrin.

A method of incorporating the flavour which has recently come into vogue, and may be mentioned in passing, is that of inserting into the finished pack a concentrated cube or lozenge containing the flavour held in fondant, jelly, or similar relatively stable solid form. The fundamental difficulties of the effective flavouring of powdered goods are thus side-stepped, but it is questionable whether this advantage is not offset by the difficulties of effective presentation.

The Problem of Retention

Turning now to the methods of retention that may be employed, we find that the general principle throughout is that of guarding the essential constituents of the essence against evaporation or chemical change by means of a protective film of inert material.

In natural pure fruit essences various resinous materials are normally present, and these have a protective effect on the more unstable essential flavouring principles. The best synthetic flavours also contain materials having a similar function; the use of glycerin in a similar capacity is well known.

One method of dealing with the problem is to mix the main ingredients where possible in such an order that the last added will form a protective film over the flavoured earlier mixing. This is important in the preparation of soup powders, cake mixtures, etc. Here the keeping properties of materials other than the flavouring materials are involved in the production of a satisfactory article.

The idea of presenting the powder in the form of compressed tablets or cubes is fundamentally that of outer layer protection. It has been exploited very successfully both in fruit drinks and soup powders.

The Importance of Packing

Assuming that a stable flavour has been properly incorporated into the powder, the success of the flavour retention rests to a very great extent with the type of packing employed.

Summarising this aspect of the problem very briefly, it will be necessary to provide such a pack as will give the least porosity, the minimum free air space, and the minimum of internal movement in the powder.

In addition the packing materials themselves must be carefully chosen, since powdered goods are particularly liable to contamination by bacteria and moulds, etc., and by foreign odours. For example, poor quality size on the inner wrapping paper, or a highly odorous varnish on the outer carton, may lead to the development of a taint which would seriously affect the flavour of the contained material.

The effects of storage on well-packed powders are thus reduced to the changes occurring in the powder itself, contamination from foreign odours, excessive moisture, etc., being guarded against.

As far as the flavour materials are concerned, the changes to be expected are a very gradual weakening due to evaporation losses, which gives mainly a loss in freshness owing to the selective volatilisation or oxidation of the more active and brighter constituents of the flavour ("fading"), and in some essences a change in character of the type particularly noticeable in the citrus oils. The various raw materials have their own problems, and the development of foreign flavours in these materials, due to bacterial (starches and milk powder, etc.) or chemical (fats, etc.) action, or both, must be studied separately.

Conclusion

It will be seen from these few notes that the problem is not a simple one, and that each product must be studied individually as regards raw materials, manufacturing details, type of flavour and method of incorporation, and finally the kind of pack, before it can be marketed with any confidence as to its continued saleability over a reasonable period.

A Question of Taste

(Continued from page 201.)

factor—the psychological one. The cases of drinking beer from a cup and tea from a glass are familiar ones.

Colour and even texture effect the good preliminary work to be completed by the gustatory one. The design of the container, the colour of the label—even the humour of the subject matter of display material—are admitted adjuncts to sales policies, and the principle might be extended to the pleasure given during actual consumption. Obviously the consumer does not look at or think about the advertisement of a product when eating it, but he is certainly subject to a well-directed previous suggestion. The success of advertising witnesses to the almost illimitable suggestibility of the human race, but might it not be directed not only to the selling of a product, but also to its greater appreciation when sold?

We are not a particularly gastronomic people. Our "cut off the joint and two vegs." bears witness to that. But we could, apart from giving the recently suggested recipes for making dishes from the various canned and preserved foods, considerably help by a more imaginative handling of advertising material, whether it be display cards, press advertising, labels, or personal demonstration.

Finally, might I suggest that on the office shelves of every food manufacturing concern should figure a copy of Brillat-Savarin's book *Physiologie du Goût*? As Walton's *Angler* has made many of its readers turn fishermen, so this work, relating to the pleasures of eating and drinking, has converted its fortunate readers into gastronomers. And who should be gastronomers if not the members of the food industry?

SAGE

By H. Stanley Redgrove
B.Sc., F.I.C., F.R.H.S.

Author of *Spices and Condiments*, etc.

TIME WAS when Sage occupied a position of leading importance among medicinal herbs. "*Cur moriatur homo cui salvia crescit in horto?*" ("Why should a man die while Sage grows in the garden?") used once seriously to be asked; and the generic name of the plant, *Salvia*, is derived from the Latin *salvere* (to be saved), in reference to its healing properties. Our own "Sage" is a corruption of this.

But if Sage has now dropped out of the pharmacopœias, its position as a culinary herb is unassailable, and from the standpoint of the food manufacturer it is one of the most important herbs, owing to its use for flavouring sausages, preserved meats, and the like.

Sage is *Salvia officinalis* L., a member of a considerable genus belonging to the *Labiatæ*, a family which is peculiarly rich in aromatic plants of interest as flavouring agents.

The plant is not a native of Britain. Its home is the Mediterranean region, but it has been cultivated in England for many centuries, and can sometimes be found growing in a pseudo-wild state as an escape from cultivation.

When in bloom, Sage is a decidedly attractive plant, but as it is rarely cultivated for decorative purposes many folk do not realise how pretty it is.

Like most plants which have been long in cultivation, several different cultivated varieties of Sage are met with. For flavouring purposes, narrow-leaved forms of the "white" or "green" variety are to be preferred.

The plant is an extremely easy one to grow on almost any garden soil, but, although a hardy perennial, it tends to degenerate after the third or fourth year. It is best renewed by means of cuttings, though propagation by sowing seed is sometimes adopted. Layering is also frequently employed.

When required for drying, the leaves should be harvested when the flowers are about to appear. The quality of the product depends very much upon the care with which the leaves are dried. Too high a temperature causes the dissipation of the essential oil to which their flavour is due. Up-to-date drying sheds are quite essential for the production of first-class dried Sage on a commercial scale.

Grinding is also a matter of importance, and the views of prospective purchasers should be consulted as to the degree of fineness preferred.

In some districts there is a marked demand for sausages in which particles of herbs can be distinctly seen. Customers then feel assured that the sausages have been properly flavoured. In other districts the exact opposite holds good. Sausages in which particles of herbs can be seen do not appeal and will not sell. Where this liking

A Sage Plantation and the Picking of Sage at the Herb Farm, Seal, Sevenoaks, Kent.

for invisible flavouring is very pronounced it may be desirable to replace Sage by its essential oil, used in the form of an alcoholic solution or essence.

In any case, and more especially in the latter event, care is needed that too high a proportion of the Sage flavour is not employed. For one thing, this flavour is apt to overcome every other flavour present, so that Sage and Sage alone can be tasted. There may be sausages made of such ingredients that this is definitely advantageous, but I am writing more especially for those manufacturers who wish to place products of first-class quality on the market. A further reason why excess of Sage, and particularly of its essential oil, should be avoided is because Sage oil is by no means devoid of toxic properties. The oil is said to act as a violent epileptiform convulsant when taken in sufficient quantity. In the minute proportions in which it is habitually consumed in the form of foodstuffs flavoured with Sage it acts, on the contrary, as a useful carminative. To eat Sage and onions with such viands as pork and roast duck is not only agreeable, it is also hygienic. The Sage facilitates digestion of the fat.

Sage is especially abundant, as a wild plant, in Croatia, Dalmatia, and the islands of the Adriatic. The wild plant resembles the cultivated one, but is of more shrubby habit. The best, it is said, comes from the islands of Veglia and Cherso, near Fiume.

The wild plant has a stronger and more spicy aroma than the cultivated one. Nevertheless, the softer aroma of English-grown Sage is finer, and there are celebrated firms of food manufacturers who are quite prepared to pay the higher price of the English-grown product for this very reason.

Commercial Sage oils are mostly distilled from wild Dalmatian Sage, which gives a yield of about 1·3 to 2·5 per cent. There is a so-called oil of Sage distilled in Spain. This, however, is quite different in aroma and chemical composition from ordinary Sage oil, and is more akin to oil of spike. It is obtained from *Salvia triloba* L. and *S. lavandulæfolia* Vahl.

The essential oil of *S. officinalis* is a yellowish or greenish-yellow oil with an intense odour and, when well diluted, flavour of the herb.

According to Gildemeister and Hoffmann (*Die Aetherische Oele*, 3rd edition), the oil has the following physical properties: Specific gravity at 15° C., 0·914 to 0·930; optical activity, plus 2° to plus 26°; refractive index at 20° C., 1·458 to 1·468; soluble in 1 to 2 volumes and more of 80 per cent. alcohol, and in 3 to 12 volumes of 70 per cent. alcohol, but the latter solutions are not always clear.

The oil contains pinene and a peculiar hydrocarbon to which the name of "salvene" has been given. It also contains cineole, borneol, and (usually) camphor.

The two most important constituents, however, and those to which the typical aroma is largely due, and also—it should be added—the toxic character of the oil, are two isomeric ketones, *alpha*- and *beta*-thujone. The first is lævorotatory, the second dextrorotatory; but they are not optical antipodes.

Thujone occurs in a number of other essential oils, such as the oils of thuja, tansy, and wormwood. It is a liquid with a pleasant herby odour, recalling that of Sage and at the same time suggesting that of menthol.

Natural thujone is now available in commerce, primarily as a cheap perfume for disinfectant sprays, furniture polishes, etc. It might be found of service in the essence industry, providing it was employed with great caution for the reasons already noted.

A Drying Shed for Herbs at the Seal Herb Farm, Sevenoaks, Kent.

Cooling of CANNED FOODS

some practical points for consideration

IN THE April issue of FOOD MANUFACTURE consideration was given to the length of time and the temperatures needed to satisfactorily process hermetically sealed articles of a perishable nature. It was pointed out that, provided accurate determinations were made of the heat penetration by the use of laboratory methods, the process time could be based upon the data obtained. Due regard must be paid to the length of time of cooling required by the contents of the can, and the necessary reduction made from the heat penetration time.

Cooling should be brought about as rapidly as possible, and therefore artificial means are invariably employed, except in the case of goods sealed in glass containers, where air cooling is usually resorted to, otherwise the strain brought about by the rapid contraction of the glass will lead to fracture. A moment's consideration will show that if the temperature gradient maintained during heating were to be reversed, then the rate of cooling should be the same as the rate of heating. This is not strictly true, because the materials in the container will have undergone a change which is likely to affect the rate of heat travel through them. This applies particularly to articles containing a cereal, for upon the application of heat the starch will lose its granular structure and become mucilage, the heat conductivity of which will be different from granules of starch in a liquid such as water. As in the great majority of cases rapid cooling is the object desired, the small difference that arises in rate of heat loss through change in the consistency of the article can be ignored.

When the processing has been conducted in a steam-heated retort under pressure, cooling may be said to commence at the time that the steam supply ceases and the relief valve on the retort is opened to permit a return to atmospheric pressure. This operation cannot be carried out too rapidly, for a sudden reduction in the pressure outside the can may lead to the bursting of this vessel.

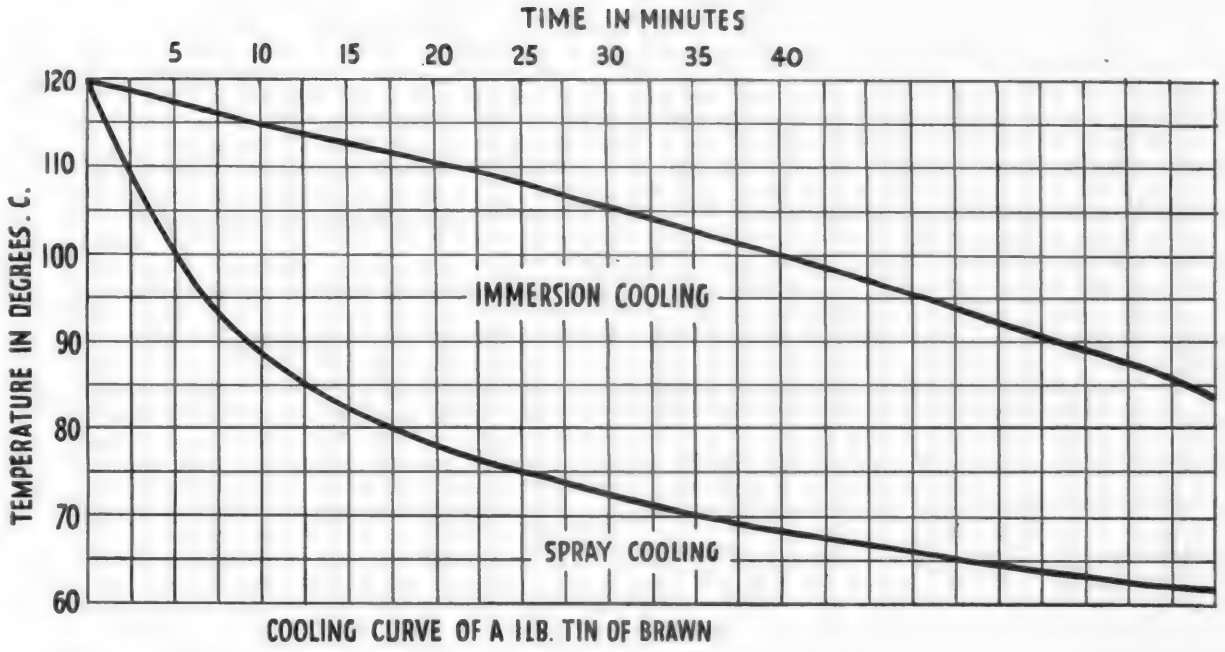
When the pressure has become normal, the retort is opened and the cans removed to the cooling plant. This may consist of either a spraying device or cooling by immersion in a bath of running cold water.

Spray Cooling

Spray cooling is by far the most rapid and therefore the best method to be adopted. The trays of cans are placed upon a movable chain belt which passes through a spray chamber so arranged that jets of water impinge upon the cans from all directions. The speed of the belt can be regulated to suit the size and shape of the containers. Where the cost of water is a serious item, it can be arranged for it to drain into a sump after its passage over the hot cans. From thence it may be pumped through a refrigerating unit and used over again. Where the cost of water is a secondary consideration, it will be found that the temperature of the main supply is usually low enough to do all the cooling that is necessary. The reason why spray cooling is so much more efficient than immersion cooling is because every droplet of water that comes into contact with the hot can is, at the earliest stage of cooling, converted into steam, and the latent heat thus absorbed by the conversion of the water into steam produces a very rapid change of heat in the contents of the can. It must, however, be borne in mind that where the article is solid the heat at the centre has to be conveyed by conduction to the outside of the container before the spray water can be effective. When the contents of the can are liquid, convection currents also play a part. Therefore the same conditions apply as in the case of heating—that is to say, the rate of cooling depends upon the size of the container and upon the nature of the contents. The finer the spray and the greater the air current in operation, the greater will be the rapidity of cooling.

Immersion Cooling

In the case of immersion cooling, the containers may be placed on a travelling belt which passes through a tank of cold water which is flowing in an opposite direction to that taken by the belt. When this method is



COOLING CURVE OF A 1 LB. TIN OF BRAWN

adopted, latent heat plays little or no part, and the rate at which the container parts with its heat is dependent upon conduction and/or convection.

The Methods Compared

A study of the accompanying curves shows the very marked difference in the rate of cooling taking place in a tin of brawn by the immersion and spray methods. At the end of 10 minutes the spray-treated can had reached a temperature of 90° C., a loss of 20° C. from its initial temperature. In the same period the immersion-treated can had lost only 5° C. It should be noted that as the spray-cooled can becomes cooler, the rate of loss of heat is much slower; this is, of course, because the part played by the latent heat becomes smaller and smaller as less and less of the water is converted into steam.

Flooding

At one time a method of flooding the retorts with cold water was occasionally used, the tins being allowed to remain in the retorts until they were cold enough to be removed. The great disadvantage of this method was that not only was the heat removed from the cans, but also from the walls of the retort, so that the rate of cooling was even slower than by immersion. As in the case of heat penetration, cooling rates should be determined for every kind of article and for every variety of container employed, and due consideration given to the data obtained when fixing the correct process.

Glass Packed Goods

When an article is packed in glass, water cooling cannot be used, for the reason stated above, and it is therefore the usual practice to allow cooling to proceed as long as possible in the retort, the glasses not being removed until the temperature has become sufficiently low to permit of handling. Air cooling is, of course, very much slower than water cooling, and this fact must be allowed for in the processing time. A 1 lb. tin of tongue should have a longer process than a 1 lb. glass of tongue, for the cooling period of the former is about one-tenth that of the latter.

There is little doubt that quite a large number of many articles of canned foods now upon the market suffer some deterioration in quality because insufficient attention has been paid to the very important details of heat penetration and rate of cooling. Accurate determinations of these two factors and strictly scientific control based upon the temperature changes during canning are essential if first-grade articles are to be produced.

CONFERENCE ON CORROSION, 1935

THE annual conference of the Working Association for Combating and Preventing Corrosion, of which the Society of German Chemists (Verein deutscher Chemiker e. V., Berlin, W., 35, Potsdamer Str., 103*a*) has the secretarial direction for this year, will be held at Berlin on Monday the 18th and Tuesday the 19th of November, 1935. The subject chosen for discussion is "Corrosion from Water", the damage caused by corrosion from water being regarded, probably, as of the most serious consequence economically. In connection with this subject the exceedingly important question of Corrosion from Salt Sea-Water will also be discussed.

THE TRAINING OF THE FOOD TECHNOLOGIST

By

H. B. Cronshaw, B.A., Ph.D., A.I.C.*

(Editor-in-Chief of "Food Manufacture")

Sugar Confectionery

THE SECOND main division of food products, conveniently referred to under the general term Bread and Confectionery, embraces Sugar Confectionery, in which sugar is the main, basic ingredient, and Bread and Flour Confectionery, into whose composition wheat flour enters as the characteristic ingredient.

Compared with meat, fruit, and vegetables which are the raw materials of preserved foods, sugar and flour present striking differences in that they are simple and relatively stable bodies from which, however, generations of craftsmen have, by ingenious manipulations, built up a host of products of every conceivable form, texture, consistency, composition, colour, and flavour. To devise a scientific scheme of classification for these products is a matter of considerable difficulty, if it is to be at all comprehensive, but for our purposes the skeleton scheme given in Table II may serve to illustrate in broad outline the physical-chemical relations of the main groups.

It is only quite recently that science has made any direct contribution to the subject of sugar confectionery. Up to the war period it was really in the position of an art which owed its development almost entirely to empiricism, and its craft secrets were jealously guarded and handed down from one generation to another by the apprentice system. That this inheritance still tends to dominate the position is evident from the dearth of literature of a scientific character; one searches in vain through the scanty writings of British, American, and German technologists for a fundamental treatment of the subject; no doubt this is due to the fact that we are in a transition stage and that no effort has been made to provide the scientific training which is required by those who enter the industry. Actually, the subject is a veritable paradise for the physical chemist, for it affords beautiful examples of crystallisation and supercooling phenomena, as well as of colloidal bodies exhibiting a wide range of complexity. Instead of this we find much of the literature given over to a most confusing medley of recipes which are not rendered any more intelligible by remarks of the "serve while hot" type, and it is this bewildering mass of material which urgently awaits clarification at the hands of the physical chemist who is also familiar with the practices of the workshop. We require someone to come along and tell us why this is done and that is added; to interpret type formulæ and works practices in terms of chemistry and physics; to explain why certain results are obtained when materials are manipulated in certain ways. In other words, we await the conscious application of scientific knowledge. Ten years ago, Dr. H. S. Paine of the U.S. Carbohydrate Laboratory remarked that the logical basis for improvement in confectionery manufacture is exact chemical and physical knowledge. That is true to-day, although during these ten years much has been accomplished in standardising confectionery produce more effectively, in obtaining greater uniformity of quality, in designing automatic machinery, and in tightening up factory control based on scientific knowledge of materials and processes; nevertheless, the underlying scientific principles of the industry are still very imperfectly understood.

TABLE II.—SUGAR CONFECTIONERY.

Vitreous and Crystallised Sugar.	*Jels.*		*Solidified Emulsions.*	*Fine Crystals of Sugar in a Matrix of Gum.*
	Aerated.	*Non-aerated.*		
Boilings Fondants Barley Sugar Rock	Marshmallow Nougat	Turkish delight Jellies Jubes Pastilles Gums	Toffee—5† Fudge—10 Caramels—25 Chocolate—30	Lozenges Cachous

* *Continued from previous issue.*

† These figures give a rough idea of the percentage fat contents.

Bread and Flour Confectionery

Flour (or bakery) products may be taken to include (1) Bread, (2) Confectionery, (3) Biscuits, and (4) Breakfast Cereal Foods and Macaroni.

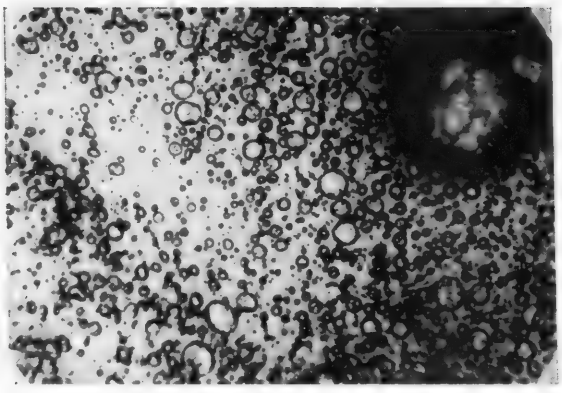
The chemistry of cereals is, thanks to the labours of Bailey and numerous other North American specialists, in quite a healthy condition and the abundant literature is usually of a high standard. This province is largely the concern of the grain grower and the miller, but it merges imperceptibly into that of the baking industries. From being once a domestic art, bread making tends more and more to become a purely manufacturing occupation in which the main lines of advance are in the more or less automatic machinery of the mass-production type and, because bread making is essentially a fermentation process, in the ways and means of gaining increased biochemical control over this process. It is in the latter field that abundant scope exists for the well-trained biochemist, for although much has been done by workers such as Jago, Kent-Jones, and Bennion in this country and Bailey and his associates in America, not to mention the various Continental workers, the physical and chemical changes which take place during the periods of dough fermentation and ripening, baking in the oven, and subsequent staling, are as yet only imperfectly understood. Dough is a complex, gluten network supporting starch granules, yeast, and the other ingredients, and during baking this network becomes set or coagulated and the starch partly gelatinised. From the start of dough-making operations to the time of consumption of the bread, enzymic and other changes are constantly taking place which influence the chemical and physical states of the dough and the bread, and it is these fundamental changes that the baker endeavours to bring under his control which constitute the scientific aspects of bread making falling within the scope of the biochemist. It is to him that we look for further light on the influence of such factors as the nature and proportions of the flour, yeast, and other ingredients, the temperature of the dough and its degree of ripeness and time of fermentation, on the quality of the bread expressed in terms of size, texture, colour, flavour, and so on. Added to this one has to take into account the various systems of bread making which are in vogue; hence arises the necessity for discovering the fundamental reasons upon which these variations in practice are based. It is to the physical chemist also that we look for solution of the problems connected with staling and the influence of lecithin, oil emulsions, etc., on gluten modification and imbibition. It is also worth mentioning a point to which my attention has been drawn by Dr. Kent-Jones—namely, the gradual change which is taking place in cereal chemistry from purely chemical determinations to the application of scientific dough-testing work with such apparatus as the Brabender Farinograph and the Chopin Extensimeter.

Flour confectionery is in quite a different category, for it is still submerged in the traditional thought of centuries, and yet here again is a field rich in material of great interest to the physical chemist. It is, however, one which presents problems of great complexity in colloid chemistry. In the first place, the ingredients used are numerous and the manipulations varied. Although flour, fat and sugar are the main ingredients, there are many others which may be incorporated, such as eggs, baking powder, yeast, fruits, and nuts. Little has been done to follow systematically the structural changes induced in the confectionery body by these various ingredients and methods of manipulation. It is true that some attempt in this direction has been made in America, as is evident from Professor Lowe's book on Experimental Cookery, and the photomicrographs reproduced from this work serve to illustrate the kind of problems which are involved. Another difficulty which has to be faced is the extraordinary abundance and diversity of the products themselves. They would seem to defy all attempts at

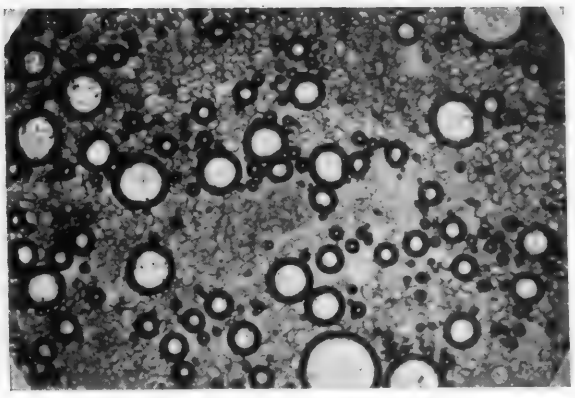
TABLE III.—FLOUR CONFECTIONERY.

	Puff Pastry.	*Slab Cake.*	*Short Pastry.*	*Aerated Buns and Scones.*	*Fermented Buns.*	*Sponge Cakes.*
Flour	16	16	16	16	16	16
Fat	16	10-14	8	4	2	—
Sugar	—	10-12	2 (optional)	4	3	16
Aerating materials	—	Eggs and baking powder	—	Eggs and baking powder	Yeast	Eggs
Examples ...	Vanilla slices Vol-au-vent cases Coventries Eccles cakes Banbury cakes Almond tarts Sausage rolls	Madeira Cherry Dundee Pound Fruit	Jam tarts Lemon tarts Fruit tarts Custards Meat pies Meat patties	Rock buns Raspberry buns Coffee buns Sultana scones Victoria scones Milk scones Soda scones	Plain buns Bath buns Chelsea buns Swiss buns Hot Cross buns Tea cakes Doughnuts	Sponge cakes Victoria sandwiches Swiss rolls Savoy fingers Othellos

NOTE.—The figures given in the above table represent parts by weight. They are only very approximate and are subject to fairly wide variations in accordance with the different types included within each group.



Photomicrograph (× 100) of creamed butter and sugar. The butter has been stained red and shows black in the picture. Note the rounding of the sugar crystals and the adsorption of fat at their surface. The smaller spheres are air bubbles and they also show a film of fat.



This shows the creamed butter-sugar-egg mixture after addition of flour and milk to form a cake batter. Large sugar crystals and small bubbles have a layer of adsorbed fat. In the background are starch granules and some very thin films of fat (× 100).

scientific classification. Nevertheless it is desirable to take a preliminary step in devising something, however crude and inadequate this may be, which will enable one to obtain a mental picture of the main groupings of the principal types of products with which we have to deal. Such a scheme is presented in Table III, from which it is seen that fat and sugar, and, of course, the aerating and emulsifying agents, have an important influence on the structure and other physical characteristics of the final product. Here, then, is yet another field which offers a rich harvest to the physical chemist. It is, moreover, one which has scarcely been explored. There is little doubt but that systematic work would throw interesting light on many a time-honoured practice and cherished theory, as well as providing the student with much material of considerable value to pure science.

(*To be continued.*)

AMERICAN VIEWS ON THE TRAINING OF THE FOOD TECHNOLOGIST

R. A. Gortner, Chief of the Division of Agricultural Biochemistry, University of Minnesota.

" I read your article with a great deal of interest, and also the comments submitted by various people and published as the discussion of your paper. I think papers such as this are likely to do much good. I was interested to see that certain individuals were rather sceptical as to the need of post-graduate training. I myself am very decidedly in favour of post-graduate training for the food chemist and food technologist. The ramifications of science are so extensive at the present time that it is almost impossible to include in the ordinary undergraduate curriculum a broad enough foundation for the specialist in any field of science or scientific technology. Our reaction here at the University of Minnesota has been that the food chemist or food technologist needs a broad foundation in analytical chemistry, organic chemistry, physical chemistry and biochemistry, and that if a concern is to keep abreast of its competitors it must have one or more persons on its staff who are thoroughly competent in all of the fields noted above. In addition, it is highly desirable that these individuals should have special work in the University in the technology or engineering features of the industry with which they are associated. We have found it relatively easy to place our Ph.D.'s in the larger food industries of America, and rather difficult to place the men with only the Bachelor's degree in such industries. In general when we have placed one Ph.D. in an industry and a vacancy occurs in that industry later on, they come back to us for another man of somewhat similar training. The men with the Doctor's degree as a rule have advanced rather rapidly in those industries where we have placed them. The men with a Bachelor's degree as a rule have tended to remain in a more or less routine capacity. I am very confident in my own mind that if a young man intends to enter the food manufacturing industry in America in a scientific capacity, he will be amply repaid by remaining in a University association long enough to acquire the Doctorate degree. The advanced training will be reflected in his initial salary and in the rate of promotion. It is, of course, self-evident that he ought to be more valuable with a Ph.D. background than he could ever hope to be with only the educational background which goes with the Bachelor's degree."

The Acting Commissioner, Bureau of Fisheries, Department of Commerce, Washington, D.C.

" I have read Dr. Cronshaw's paper with a great deal of interest. I consider it a most comprehensive discussion of a very complex problem. I am of the opinion, however, that he did not stress sufficiently the importance of engineering training.

" The field of food manufacture is so broad and the application of the basic sciences so diversified that there must always be such specialists as food chemists, food bacteriologists, etc. These investigators will continue to supply fundamental chemical, bacteriological and biological information with respect to food problems. There is, however, a wide gap between laboratory results and plant application. The food technologist therefore must fill this gap by reconciling such data with the principles of engineering involved in a suitable manufacturing process. The food technologist might be looked upon as a combination chemical, bacteriological, and biological engineer.

" Because biological and bacterial processes are in reality chemical reactions, it would seem that the ideal basic train-

ing of the food technologist would be chemical engineering with sufficient attention to bacteriology and biology to permit an understanding of their aspect to industrial problems. Specialisation in food technology should then follow as post-graduate work, as Dr. Cronshaw suggests. My difference in opinion, therefore, is that I interpreted Dr. Cronshaw's paper as inferring that the application of engineering would be picked up as incidental during the post-graduate work, while I feel that it should be established as a basic part of the preparation in fundamentals."

R. W. Clough, National Canners' Association, Northwest Branch, Seattle.

" I have been much interested in your article, ' The Training of the Food Technologist ', and in the comments and correspondence, printed in the March issue of FOOD MANUFACTURE, which your article elicited. It seems to me that you

A View in the Salmon Inspection Laboratory at Seattle. Mr. Clough is taking notes, while Mr. Shostrom is examining a few cans and Mr. Crose, the head sampler, is opening the cans. In busy times the tables are piled high with cans and sometimes over 3,000 are cut in one day.

have given a great deal of time and thought to this article and have gathered together much valuable material. It would be desirable to have this reprinted in pamphlet form for ready reference.

" There is no doubt about the need for trained food technologists possessing a broad foundation of fundamental knowledge, including both principles and practice. Such workers could interpret the results of research stations for the particular branch of the food industry with which they were connected and could carry on controlled experiments to test the value or truth of these results as applied to large-scale operations. The Food Industry is probably the largest industry in any country, and the one which most closely concerns its people.

" The food technologist should be trained in chemistry, bacteriology and biology, each taught with a special slant toward its application in the production of food. It would be very fortunate if the student could spend a part of his time actually working in some food manufacturing plant, or preferably a series of plants, putting his theory into practice. Such experience would enable him to go back to school with a greater appreciation of the importance of the subjects taught and with a more eager, receptive and enquiring mind. This liaison with the food industry would serve the school better than its necessarily limited, small-scale operation machinery, would keep the teaching staff on its toes, and would tend to keep the industry abreast of, and sympathetic with, research. The granting of fellowships supported by various branches or units of the industry is, of course, in this direction.

" Although not mentioned in your paper, I believe you would no doubt advocate a liberal dose of composition and public speaking for the purpose of developing the technologist's ability to present his ideas logically, succinctly and convincingly. There is nearly always inertia, indifference, or even hostility to be met in the introduction of new ideas, and it will be of little value for the technologist to perfect new and better ways of doing things unless he can convince his associates, subordinates and employers of the superiority of these new ways.

" I believe your article will do much toward providing better training for food technologists and a wider appreciation of the value of well-trained technologists to the food industry."

W. V. Cruess, Professor of Fruit Technology and Chemist in the Experiment Station, University of California, Berkeley.

" Dr. Cronshaw has presented very clearly and forcibly the case for a more adequate curriculum for the training of food technologists. I am in substantial agreement with him in most of his statements. I wish there were somewhat more suitable terms than ' food technology ' and ' food technologist '. Sir Frank Smith's suggestion of ' food science ' is good, but I do not like ' food scientist '. In so far as I am aware no University in America offers the comprehensive course of instruction proposed by Dr. Cronshaw.

" I am of the belief that the first essential is a thorough training in the basic sciences of inorganic chemistry, organic chemistry, analytical chemistry, physical chemistry, biochemistry, colloid science, bacteriology, physics, botany, and mathematics. Also the candidate should receive some training in mechanical and electrical engineering; for this mathematics is necessary. Too many University graduates are ignorant of the use of common tools; a semester or two of what we call ' shop work ' would be desirable. In order to gain experience in the analysis and examination of foods, laboratory and lecture courses in the microbiology and analysis of foods should be taken. These should be supplemented by lecture courses in food technology—*i.e.*, in the principles and practice of food manufacture and preservation. Our students in Fruit Products at the University of California receive essentially the instruction outlined. However, the aim is to provide the student with a rather broad

W. V. Cruess, Professor of Fruit Technology and Chemist in the Experiment Station, University of California.

scientific training rather than to attempt to make him into a specialist, who could upon graduation take a position as cannery superintendent or manager of a vegetable oil factory.

" It is our experience that a young man who is well grounded in chemistry, bacteriology and physics, who has some knowledge of engineering and who, in addition, possesses some natural aptitude for the profession, advances rapidly in the work. Our graduates often are first employed as assistant chemists and later, as opportunity affords, they transfer to duty in the plant as foremen or assistant superintendents.

" In order to provide practical plant experience in all the important food industries it would be necessary for a Univer-

sity to maintain a tremendously costly plant: perhaps such as a bakery, a brewery, ice-cream factory, candy factory, vegetable oil factory, dairy products factory and so on, with a specialist in charge of each. In our department at this University we encourage the students as undergraduates to work during the summer vacation periods in food establishments in which they are most interested. Thus, they may work in a fruit drying yard, or a cannery, jam factory or citrus products plant. We no longer maintain a commercial scale food processing and preservation establishment; we did so at one time, but it required so much attention and expense that there was little energy, time or money left for instruction. We are equipped, however, to conduct experiments on a semi-commercial scale, but do not prepare foods for sale.

"The training outlined above is for our undergraduates and covers a four-year period of study leading to the Bachelor of Science degree. The graduate is then well qualified to undertake specialisation. Our graduate students are of two kinds: those who intend to follow food chemistry or research as a career and those who prefer eventually to become superintendents of canneries, etc. The former undertake research leading to a Master's or Ph.D. degree; the latter undertake an investigation of more practical nature in co-operation with some food establishment.

"At the Massachusetts Institute of Technology in Boston, Massachusetts, I am told that students in chemical engineering spend much of their time in industrial plants where they work as teams of several men under an instructor's direction, taking chemical and engineering data on plant processes and equipment. The group may spend a week or ten days in one plant. Where industry is favourably disposed, this method of acquiring plant experience appears to be an excellent one. However, I am inclined to agree with Sir Frank Smith that after all is said and done the candidate can best acquire his practical experience in the plant itself after he has left the University and taken a job.

"The Mellon Institute in Pittsburgh, Pennsylvania, co-operates closely with various American industries in the following manner: Industrial organisations establish well-financed research fellowships for investigation of problems that their technical staffs cannot undertake. Often the person assigned to the research is a Ph.D. The Institute supervises the research and provides facilities. Much valuable information has been secured by this co-operative work and many high-class men have been trained for subsequent service in industry. Doubtless this plan could be followed by the food industries and various Universities with mutual benefit. While not the immediate goal, the developing of food technologists would be a valuable by-product of such industrial fellowships.

"It would probably not be necessary to maintain a large University staff of Professors, Associate Professors, etc., of food technology; but by proper utilisation of existing departments of chemistry, bacteriology, engineering, botany, physics, etc., a relatively small staff of food specialists could meet the needs of the situation adequately. Specialists from the food industries might be called upon to lecture to classes; we find this arrangement very useful.

"The biochemistry and physiology of plants as well as that of man should be included in the curriculum. The work of Kidd, West, Onslow and others at Cambridge illustrates the importance of this field of study. Colloid science is extremely important in food technology. The basic principles of fermentation provide an excellent mental 'workout' and are, as well, useful practically.

"Hydrogen ion relationships and determination are of great and increasing importance. Every food technologist should be familiar with the theory, terminology, and determinations of *p*H and *o-r* potential.

"When it comes to growing the crops and the animals for the food industries, I am of the belief that the food technologist need have only a general knowledge of the subject. He cannot be a specialist in all things; and, in America at least, our large packing and canning organisations maintain field staffs who devote all their time to production of the raw materials. Likewise, the improving of varieties is a job for the geneticist (working with the advice of the food technologist).

"Economics, and even politics, are subjects of which the food technologist should not be entirely ignorant. He can get the basic principles and theory in the University and acquire the applied knowledge on the job.

"A knowledge of cost accounting and business management will be necessary; whether an attempt should be made to present this instruction to the food technology candidate in the University is a question for discussion. We cannot teach him everything in a four or five year course!

"In America certain Universities are known for the training given in special industries. Thus, Oregon Agricultural College maintains a commercial cannery and specialises in training canning technologists; the University of California Farm School operates a modern commercial scale dairy products factory, including ice-cream equipment; Iowa Agricultural College is noted for its large-scale establishment for the utilisation of agricultural wastes; Washington University for its School of Fisheries, and so on. Therefore, it would be possible for a student to acquire his undergraduate instruction in chemistry, bacteriology, physics, etc., together with courses in food analysis in any one of several Universities, and then study at some other institution where facilities and instruction are available to permit specialisation in some food industry. However, this does not meet Dr. Cronshaw's requirements and suggestions very well.

"By way of summary the writer would say that he favours a thorough training in the basic sciences enumerated earlier in this note, supplemented by instruction in food analysis, food technology, shop work, engineering, and vacation experience in various industrial plants. This four-year curriculum would be followed by about two years' graduate study and research in the field in which the candidate might desire to specialise."

We have received from the Fruit Products Laboratory, University of California, under the direction of Professor W. V. Cruess, a syllabus giving particulars of the courses which fruit products students are required to complete. In addition to the plant science curriculum, they must take courses in plant biochemistry, animal biochemistry, physical chemistry, and the special courses in fruit products which include food microbiology, food analysis, and the microscopical examination of foods.

Dr. W. Lee Lewis, Director of the Department of Scientific Research of the Institute of American Meat Packers.

"I think it is inevitable that wherever three or four professional men are gathered together, there will be four or five views on the educational problems of their profession.

"I spark on so many points of your splendid articles on the training of food scientists, both with accord and disagreement, that I am nonplussed where to start. I will merely touch on a hobby of mine in this general connection. First of all, the chemist suffers from a lack of official definition. I use the word chemist not in a restrictive sense, but in the broader sense of the scientist of matter. He is left to decide when he has become a chemist and the conclusion is more often dictated by considerations of expediency than adequate training. Result—disappointment to both employer and employee.

"What we need is more chemists-plus. By chemists-plus I mean men who are not only trained in chemistry and the basic related sciences, but men who can rise to the responsibilities of public health, national economics, and the ethics of food nutrition and advertising. We need more scientific executives and fewer craftsmen. We need men who are willing to prepare and to resist the destructive practice of industry of picking promising men before they are ripe.

"In this country, waiving for the moment the many short cuts such as the trade schools and early specialised courses, the young man contemplating chemistry as a profession normally spends four years in a high school, four years in a University, and approximately three years acquiring the Doctorate. He has come up through an ultra-academic environment. Small wonder that he has a prejudice in favour of the non-utilitarian or so-called 'pure' in science. He has been so taught by professors who were taught in the same manner. And yet the large majority of these men, trained essentially for the academic career, find their way into in-

dustry. There is a little too much intellectual in-breeding in our Universities.

"And so I visualise a type of research director for the food industries who wanders wisely and widely during these seven years, preferably with the early decision before him that he is going to be a food scientist. I think the fear is not that he will fail to acquire sufficient chemistry during his four University years, but rather that he will acquire too much. He should be exposed to engineering, know something of the science of business, and he should seek all the cultural development that moderate specialisation during the period will permit. (How many chemists can write an intelligent report?) When he finishes his Doctorate, which must necessarily be a period of intense specialising, he is not ready to enter upon his practical ministry. Research to him is a deliberate procedure in which time is ignored, and practical evaluation of results, a new experience. He has not yet faced the exigencies of a seasoned board of directors contemplating next year's research budget from a dividend standpoint. As it has been well expressed, he has no conception of the 'required tempo of the business world'.

"I would take such a young man and provide him with a sort of interneship preparatory to actual practice. I visualise a great Industrial Food Institute where this training could

Dr. W. Lee Lewis, Director of Research Laboratory of the Institute of American Meat Packers.

be given, preferably within a year. Such an Institute should be free from economic worries through insufficient endowment, but it is perfectly thinkable that it could become partially self-supporting through placement of industrial problems on a fellowship basis. The staff should be made up of men who have had industrial experience and, of course, thorough scientific training. One can see many vistas opening up, such as the utilisation of current research results from the larger food manufacturers, the industrial associations, and all such agencies, governmental and otherwise, engaged in food investigation. Visiting lecturers from research directors in the food field would add verisimilitude.

"Lest this communication becomes too discursive, I have merely outlined the plan. I believe that industry would respond to such a promising opportunity to plough back socially some of its profits. I agree with you that the food industries need better scientific executives. I agree with you that this important field has been particularly neglected. I believe this is largely due to the fact that the food industries are among the oldest industries and, therefore, most enmeshed in tradition. But with the rapid social and economic changes which have, among other things, delegated to industry the old household task of preparing and conserving foods, we need some broad gauge food scientists and we need them now."

EMULSION TECHNIQUE

At the end of last year a highly successful symposium was held in London at which a number of papers on emulsion technique in various branches of industry were read and discussed. This symposium was arranged by the British Section of the International Society of Leather Trades Chemists, and Professor F. G. Donnan, F.R.S., presided. Now the various papers which were presented have been collected into a volume entitled *Technical Aspects of Emulsions*, which is edited by Mr. A. Harvey.

The papers contained in this useful volume bear striking witness to the great importance of the part played by emulsions in many industries. There is, for example, the application of the science and technical art of emulsions and emulsification to industries such as food, agriculture, medical preparations, paint and varnish, road materials, rubber, leather, and wool. Some idea of the range of subjects treated will be gained from the following summary of the contents of this book. Professor Freundlich deals with the mechanism of emulsification, Dr. Clayton with patent literature, Dr. Corran with the principles of mayonnaise manufacture, Drs. Walsh and Frazer with the use of highly dispersed emulsions in the treatment of toxæmic conditions, Mr. Johnson with the design of emulsifying machines, Dr. Woodman with insecticidal sprays, Mr. Gabriel with dispersions of asphaltic bitumen, Mr. Dorey with emulsions stabilised with soaps, Dr. Jordan with the stability of emulsions in thin films such as enter for consideration in the paint and varnish industry, while the wool industry is dealt with by Drs. Speakman and Chamberlain, the leather industry by Messrs. Atkin and Thompson, and the rubber industry by Dr. H. P. Stevens and Mr. W. H. Stevens.

We join with Professor Donnan in congratulating the British Section of the organisation on their initiative and energy in arranging these symposia and publishing their results. This is a work of the highest value for the advance of science and the progress of those branches of industry which demand for their successful pursuit a profound knowledge of the theory and practice of emulsification in all its aspects. There is no department of science which has so wide a field of direct application in industry.

FUNGI FOR FOOD

Dr. Norman wishes us to make the following correction in his article on Fungi for Food, published in the April issue:

"On page 131 is the statement 'All the carbohydrate preparations from lower fungi have turned out to be glucose polysaccharides. . . .' This should be qualified perhaps by the insertion of the word 'nearly', to read: 'Nearly all the carbohydrate . . .' Professor Raistrick has just found a mannose polysaccharide produced by a penicillium, and I believe that a galactan has been described once."

CENTENARY OF HENRY WIGGIN AND CO., LTD.

New Research Laboratories for Birmingham

(By Our Own Representative.)

STRANGE AS it may appear, a veterinary surgeon and the son of a woollen draper were the founders of the firm now known as Henry Wiggin and Co., Ltd. The former, Charles Askin, noting some indifferent specimens of German silver while travelling in Europe, and having an inclination for scientific experiment, returned home determined to produce a better product. He and the other founder, Brooke Evans, who eventually controlled the commercial side of the business, began in a modest way in George Street, The Parade, Birmingham, under the sign, "Nickel Refiners and German Silver Manufacturers". Out of this small beginning has thus grown one of the largest and best equipped rolling mills in Europe for the production of nickel alloys, now at Wiggin Street, Birmingham.

The first raw material which Askin used for obtaining nickel was a nickel speiss residue, obtained from the pottery district of Staffordshire, but this source of supply very soon ran short, resulting in serious difficulties. Obtaining some arsenical-nickel-cobalt ore from the Carpathians, it was at first found impossible to separate the nickel from the cobalt.

A fortunate suggestion by no less a person than White Benson, father of the late Archbishop Benson, solved the problem. Using only half the quantity thought necessary, Askin obtained a precipitate of cobalt sesquioxide by the addition of bleaching powder, the green solution above it containing the nickel, from which the metal itself was precipitated with ordinary lime.

Henry Wiggin Enters the Business

Nine years later a young man, Henry Wiggin, also intended to be a woollen draper, forsook that trade and joined with Askin and Brooke Evans. At that time Elkington's discovery of the possibility of commercial electro-plating was increasing the demand for "German", now "Nickel", silver, in consequence of which it was decided to remove the refining business to larger premises.

In 1847, when Askin was about to retire, he died in Gusdal, Norway; and in his will favourably remembered Henry Wiggin, so that the young man at the age of 24 was taken into partnership by Brooke Evans. Fourteen years later Evans died, and within a year or so Henry Wiggin was in sole charge of the business.

He took a very interested part in the town life, becoming a member of the Birmingham council, and then three years later Mayor of the city. In 1880 he became a Member of Parliament, where he sat for twelve years. His hobby was agriculture, and the story is told that at harvest time he sent his workmen from Wiggin Street to his farm, where he said they were of more use helping to get the harvest in than refining nickel. In 1901, Sir Henry Wiggin, Bt., as he subsequently became, celebrated with Lady Wiggin their golden wedding, and four years later he died at the great age of 81.

Association with the Mond Nickel Co.

The history of this Company, like that of many other Midland Companies, is essentially romantic. Associated as long ago as 1890 with Dr. Ludwig Mond, inventor of the Mond process of nickel refining, the Company became amalgamated with the Mond Nickel Co., Ltd., shortly after the war. This association has been happily very successful, and to-day a great variety of work is undertaken in connection with the production of finished and semi-finished manufactures of nickel and its alloys, including pure nickel, Monel metal, nickel silver, nickel iron alloys, etc., now extensively used in chemical and food plant manufacture.

The Centenary Celebration

To celebrate the centenary the directors of Henry Wiggin and Co., Ltd., gave a luncheon at the Grand Hotel, Birmingham, on Friday, May 17, at which the guest of honour was Dr. E. L. Burgin, M.P., Parliamentary Secretary to the Board of Trade. Introduced by the Chairman, Lord Weir of Eastwood, Dr. Burgin proposed the toast "Trade and Industry" in a brilliant speech remarkable for its spontaneity and wit.

An interesting observation communicated by Mr. Geoffrey Lloyd, M.P., one of the respondents to the toast of "The Guests," proposed by Lord Melchett, is well worth repeating. Mr. Lloyd remarked that we must continue intensive research upon complicated products in order to supply countries which are at present engaged in developing the manufacture of primary products and who are thereby increasing their producing power and consequently their ability to buy the more complicated manufactures of the industrially advanced countries.

Extension of Research Work

It was in responding to the toast of "Trade and Industry" that Mr. Robert C. Stanley, President of the International Nickel Company of Canada, emphasised the Company's policy of finding new applications for its products, and added that it was appropriate for him to announce the intention of the Company to erect a new well-equipped research laboratory in Birmingham which would, he hoped, prove to be of mutual benefit both to the Nickel Company and to the consumers of the metal.

A Visit to the Works

All the guests at the luncheon were presented with a very handsome bound leather wallet as a memento of the centenary, and many were afterwards conducted on a tour of the works at Wiggin Street, Birmingham, where every operation from the casting of billets of the various alloys to the drawing of wire finer than human hair and stamping of blanks for spoons and forks was in progress. Compared with about four years ago, when we last visited this works, the extension and modernisation of the equipment has practically converted it into a new works, notable for its orderly arrangement, brightness and cleanliness, which must be conducive to a very high purity of the metals and efficiency of production.

We are in complete agreement with Sir Felix Pole, who, in his speech at the luncheon, paid a tribute to companies who not only continue in existence for one hundred years, but who, at the end of that time, are in a flourishing condition like this one.

Book Reviews

PLANNING ADVERTISEMENTS

IT is too much to hope that everyone who places advertisements in papers will read Gilbert Russell's book, *Planning Advertisements*, just published at 6s.

It is particularly the firms who advertise in a small or restricted way who should read it thoroughly. The very big firms, speaking advertisingly, usually employ a highly paid specialist and are big enough to leave him to his own work, and therefore do not need the assistance of this book quite so much.

Mr. Russell has obviously had experience in writing advertisements, which is apparent to those who may not know his work, and this book indicates that he has also had experience in persuading clients to do what he knows to be right but which is opposed to their own ideas. The standardised signature block, for instance: "There may be advantages in a name thus appearing in one form (*i.e.*, Name Plate) . . . it becomes familiar to the public." On the other hand: ". . . . new styles, modern conceptions, originality, versatility, must all take second place to a mere form of lettering!"

A paragraph in the early part of the book makes a strong appeal to the reviewer. It deals with the manufacturer passing his opinion on a suggested advertisement. Mr. Russell goes on to say: ". . . he is anxious to see how he reacts to them. And there at the very outset we are at cross purposes, for I must remind him that he is not a normal nor even a typical observer: . . . these advertisements were not intended for him at all, but for the persons who may . . . use the commodity he sells. . . . They did not begin . . . with the question, 'What do we want to say?' They begin, as nearly as can be contrived, at the point, 'What does the public want to know?' . . ."

Mr. Russell has some interesting and valuable comments on the choosing of advertising media, although the book is written not so much on this subject as on using them after selection. He refers to the very high cost of duplicate advertising. He says: "It is inescapable that some 'readership' should be duplicated and that periodicals should be employed which, by reason of their overlapping, convey the advertiser's message in some part to people who have already been reached by another route.

"The point is that the advertiser ought to know how much of his expenditure upon media is being used up in this relatively unproductive way. He ought to know as exactly as patient and exhaustive inquiry can discover. The proportion may be startling. One hears frequently that advertising rates are too high, and that the cost of advertising is ruinous. That controversy is not going to be discussed here. But I suggest that a very great deal of advertising is costing more than it need because advertisers have not measured the proportion of their expenditure which is relatively unproductive for the reasons given. I repeat that the proportion may be startling. An advertiser might reduce his expenditure by as much as 20 per cent. and yet reach as many possible customers as before and as frequently."

There is a lot to agree with in Mr. Gilbert Russell's book. Another phrase of his which meets with our warm approval is this: "Advertisements do not lose their novelty by repetition, for the simple reason that the public at large does not read advertisements repeatedly."

The book devotes two chapters to planning the message and other chapters deal separately with planning the advertisement, planning the design, and such special departments as form letters, hoardings, posters, advertising to the retail trade, films and broadcasting, and a very valuable chapter on the selection of an advertising agent.

We feel there are very few of our readers who would not benefit from a perusal of this book. W. L. H.

Planning Advertisements. By Gilbert Russell. Size $7\frac{1}{2}'' \times 5''$. 160 pages, 40 illustrations. Price 6s. net.

HUTCHINSON'S A-Z TIME TABLES

IF you want to know how to get somewhere you usually ask for a "Time Table", which, when you think of it, is rather an absurd expression and might mean anything. A "Railway Guide" is much more expressive of what you want if you intend to go by train. But when all the present means of travelling are recorded in one book it is perhaps permissible to use the general term "Time Table"; or perhaps it would be better to say "Travel Time Table". Anyway, Hutchinson's now publish every month (they commenced on May 1) what they describe as "A to Z Time Tables". This is the only Time Table Guide giving services from London by Tram, Coach and Air, also Continental Services by Air and Rail, and Steamship Sailings from British Ports. The price is 1s. 6d. monthly, and it should be an extremely useful book for all business houses to possess. The guide incorporates the London Red Rail Guide which was founded in 1913. G. W. L.

Cream Buns

SOME instructive views were expressed in connection with the summoning of two catering firms on January 18 at Wood Green Police Court for selling "Devonshire cream scones" and "Cornish cream scones" in which the "cream" contained 95 per cent. and 83 per cent. respectively of fat foreign to milk-fat.

It was contended for the County Council that if these articles were sold simply as cream scones and cream cakes there might be room for argument as to the propriety of their sale, but the application of the adjectives "Devonshire" and "Cornish" was associated in the public mind with dairy cream.

On behalf of the defendants it was stated to be common knowledge that the filling in cream buns bought from a baker was not, as a general rule, dairy cream at all. The dictionary definition of "cream" was given as "Used in relation to confectionery, a cream-like substance used in the filling of cakes". The word "cream" could not be held by itself to denote "dairy cream", otherwise the terms "boot cream" and "salad cream" would not be correct descriptions. The prohibition of the use of preservatives in cream had made it impossible to employ dairy cream for confectionery purposes unless immediately consumed. Bakers had, therefore, been driven to use substitutes. In these cases a vegetable oil of much greater purity, bacteriologically, than the ordinary standard for dairy cream had been used. The description "Cornish" cream, counsel agreed, might lead the public to think of clotted cream, and the firm was henceforward going to omit that description.

Industrial News

DEATH OF MR. HUGH PLAISTOWE—KING HONOURS CHEMISTS—EDUCATION IN INDUSTRIAL DESIGN—TOFFEE FACTORY BLAZE—INDUSTRIAL PROPERTY MARKET—WATER TREATMENT—COLOUR-TESTING APPARATUS—REFRIGERATOR SHIPS

Death of Mr. Hugh Plaistowe, Confectioner and Manufacturing Chemist

We regret to announce the death of Mr. Hugh Plaistowe at his home, Cottesloe, Perth, W. Australia, on April 23, 1935, aged 65 years. Mr. Plaistowe was Chairman and Managing Director of Messrs. Plaistowe and Co., Ltd., Perth, W.A., Chocolate and Confectionery Manufacturers, and Chairman of Messrs. Plaimar, Ltd., Perth, W.A., Manufacturing Chemists and Essential Oil Distillers.

Born in London, 1870, he was the son of W. J. Plaistowe, Managing Director, Messrs. Plaistowe and Co., Ltd., Manufacturing Confectioners, King's Cross, London, N. He was trained in his father's business at King's Cross, but was never strong and, at 20 years of age, sailed to New Zealand, where it was hoped that a year or two at farming would enable him to obtain good health and return to his father's business then rapidly expanding.

In 1892, after two years in New Zealand and feeling much stronger, he sailed to West Australia, a State then much in its infancy and undeveloped, as compared with the Eastern States of Australia at that time.

Settling down in Perth, he decided to exploit the training received in his father's business, and with a very modest capital opened up the "Silver Pan" Confectionery Works, Perth, which business, under his tireless direction, developed steadily and is to-day the largest and most progressive chocolate and confectionery manufactory in West Australia, with branch offices and showrooms in the several other State capitals.

It is interesting to mention here that the many tons of fine Empire cocoas exhibited at the British Empire Exhibition, Wembley, 1924-25, were purchased for Australia by Mr. Hugh Plaistowe and at Perth converted into a special line of "All British" Wembley Exhibition chocolate and re-exported to all those Colonies whence the cocoa originated.

With energy remarkable for a man not physically strong, Mr. Hugh Plaistowe expended much time and money in efforts to develop the natural resources of West Australia, and in 1919, with the assistance of Mr. H. V. Marr, a highly skilled chemist, he founded, in Perth, the firm of Plaimar, Ltd., to-day considered to be the largest distillers of essential oils in Australasia, and whose products are now well known throughout the world.

Under his direction, large areas of bushland have been cleared and planted with peppermint and lavender

The Late Mr. Hugh Plaistowe.

obtained from Mitcham, also geranium and other aromatic herbs for distillation, in addition to seeds and plants obtained from all over the world and placed at the disposal of local settlers in an endeavour to develop industry and open up the country.

Undoubtedly, Australia has lost a great pioneer who would probably have lived many more years had he been content to ease the reins in latter days and watch the development of the fruits of his many labours. As it is, there are many hundreds throughout the Commonwealth, particularly in the West, who had been pleased to count him their friend and helper during the early days of their settlement in a new country, and will grieve at his passing.

He leaves a widow, two daughters, and three sons, the latter all actively engaged in and controlling the chocolate and confectionery business.

The King Honours Chemists

H.M. the King has conferred his Patronage on the 54th Annual Meeting and Conference of the Society of Chemical Industry which takes place in Glasgow on July 1 to 6.

This congress is one of the outstanding scientific events of the year and brings together many scientists from all parts of the world. Among the subjects to be discussed at Glasgow in July are the transport of food by road, rail, and sea, problems of water supply, and chemical engineering in the Navy.

Congress for Scientific Management

The occasion of the Sixth International Congress for Scientific Management, to be held in London from July 15 to 20 this year, under the Patronage of H.R.H. the Prince of Wales, will doubtless prove an event of considerable national importance, for management has never previously been the subject of a large conference in this country.

The Federation of British Industries in 1933, convened together representatives of numerous professional and scientific bodies, who undertook the work of arranging the Congress. An excellent and varied series of papers has been secured and these will be printed and made available to members before the Congress, which will be under the Chairmanship of Sir George Beharrell.

Bournemouth Health Congress

The Royal Sanitary Institute is holding its annual Congress at Bournemouth from July 15 to 20 next, when discussions will range over subjects such as the Medical Service of an Industrial Concern, Administration of the Food and Drugs (Adulteration) Act, 1928, etc.

Hotel and Catering Exhibition

The hotel, food, and catering trades will be represented at an exhibition to be held at Olympia from November 29 to December 6 next.

Dorland Hall

Dorland Hall, which until December, 1934, was conducted by Mr. G. D. Smith, is in future to be carried on by Mr. G. W. Kettle for exhibition purposes. The hall is situated in the centre of London, near Piccadilly Circus, and can be divided up for any size of Exhibition or Trade Show from 5,000 to 30,000 superficial square feet.

A number of exhibitions have been held in this hall, including Modern Packing Exhibition, British Industrial Arts Exhibition, Wine and Spirit Trade Exhibition, etc.

Leipzig Fair

The Leipzig Autumn Fair opens on August 25, 1935, the General Samples Fair closing on August 29, the Textile Fair on the 28th, and the Building, Household, and Industrial Equipment Fair on the 29th.

South Australian Centenary

South Australia is to celebrate its centenary in 1936, and an Empire Exhibition will be held in Adelaide from March 20 to May 16 under the auspices of the South Australian Chamber of Manufacturers.

The Exhibition will be styled "Adelaide Centennial," and particulars of it can be obtained from the Trade Commissioner for South Australia, Australia House, Strand, London, W.C. 2.

The Temperamental Factor in Industry

Professor Greenwood gave the second lecture on The Temperamental Factor in Industry, entitled "Temperaments Physical and Psychological in Modern Science", at the London School of Hygiene and Tropical Medicine on Monday, May 20. This was the second of a series of lectures arranged by the National Institute of Industrial Psychology, the third and final one of which was given by Dr. May Smith of the Industrial Health Research Board on Monday, May 27, entitled "Industrial Applications". The first lecture was also given by Professor Greenwood on May 13, entitled "Modern Importance of the Temperamental Factor and its Ancient History".

Professor Greenwood said that if psychological methods are used in deciding whether or not individuals are suitable for a particular industrial occupation, then among those who are accepted will be a high proportion of suitable persons, but probably a certain number of unsuitable individuals will be accepted, while some suitable individuals will probably be rejected.

This conclusion followed the observation that modern research is giving means of classifying people into temperamental types according to physical or psychological characteristics. But these classifications are of less value in deciding whether or not a particular individual belongs to one or another type. They are valuable only in dealing with groups, such as races or nations.

A Jam Boiling Thermometer having a range of 190-240° F. fitted with a clear dial and pointer, the sensitive bulb being strongly protected. The instrument illustrated is specially provided with a lettered dial instead of the usual numbered dial.

(By courtesy of the Cambridge Instrument Co., Ltd.)

Compulsory Levy for Co-operative Research

Answering a question in the House of Commons recently, Mr. Baldwin stated that the D.S.I.R. had received replies from all the Research Associations as to whether in their opinion the industries they served would favour the introduction of an Enabling Bill for a levy on all firms in an industry for co-operative research.

The trend of opinion expressed, however, did not lead to the hope that the powers of such a statute would be widely exercised.

Education in Industrial Design

In view of the apparent importance attached to industrial design, as exampled by the interest taken in the recent Academy Exhibition, the President of the Board of Education (Viscount Halifax) has been considering the steps that may be taken to improve the education of designers and the part that the Royal College of Art, as the National College, ought to play in such a development.

He has, therefore, appointed a committee to consider the subject and to advise how the teaching of fine and applied art on the highest plane could be advanced. The committee is under the Chairmanship of Viscount Hambleden, and Mr. B. P. Moore of the Board of Education is secretary.

British Food Scientists Visit Continent

Nearly 50 food scientists from all parts of the British Isles left London on Thursday, May 30, to take part in a tour of French and Belgian municipal and industrial laboratories.

They are members of the Food Group of the Society of Chemical Industry, and the object of the tour is to inspect at close quarters Continental methods of food production and scientific control. Amongst the delegates will be some of Britain's greatest authorities on the analytical control of the nation's food supply.

The party will be led by Dr. L. H. Lampitt, Chairman of the Food Group.

Toffee Factory Blaze

A disastrous fire occurred at the factory of Walters' Palm Toffee, Ltd., in Westfield Road, Acton, on the night of Wednesday, May 8. The factory was completely gutted, more than 50,000 square feet of buildings being destroyed and all the machinery.

The fire is believed to have commenced in the offices and caretaker's apartments, next to the department where large quantities of sugar, butter, etc., were stored, and once these stocks caught fire the flames rapidly spread throughout the building. About 80 men who were at work on night shift got safely out of the building.

Industrial Property Market

Chamberlain and Willows of 23, Moorgate, E.C. 2, send us regularly their News and Notes in the form of a printed monthly in which factories, warehouses, and offices and sites upon which they may be erected are described and offered. City and suburban areas are widely covered.

Lloyd's Import Duties List

This useful list is published at approximate intervals of two months (with intermediary supplements). The May 17 issue for this year contains, for example, a table of United Kingdom Custom Duties, a summary of the Import Duties Act, 1932, a summary of the Ottawa Agreements Act, in addition to the detailed information concerning Import Duties on all and sundry things. An index is provided, but some care is needed in using it because the headings may cover many things. The price is one shilling and sixpence per copy, or ten shillings annually.

Industrial Gas Equipment Bulletin

No. 1 of this bulletin, dated March, 1935, which is very diminutive in size, is issued by the Selas Gas and Engineering Co., Ltd., and contains information about commercial heating, gas-fired combustion tube furnaces, and such equipment.

Some of the headings of the paragraphs strike a new note for an industrial bulletin. The introduction is entitled "Equipmenta" and is followed by a section headed "The Greeks had a Word for It", which has no connection with the successful play of the same title, but is an explanation of the history and meaning of the word "Selas". Another section headed "For their Especial Safety" connects up mine explosions and fires with gas-fired furnaces for fuel analysis work.

Fire Fighting Suits

Special asbestos suits which will permit fire fighters to enter flames with immunity are manufactured by Bells Asbestos and Engineering Supplies, Ltd., of Slough. Such suits, which, we understand, were originally designed for rescue work in connection with aircraft fires, may be used to save life from fire under almost any conditions.

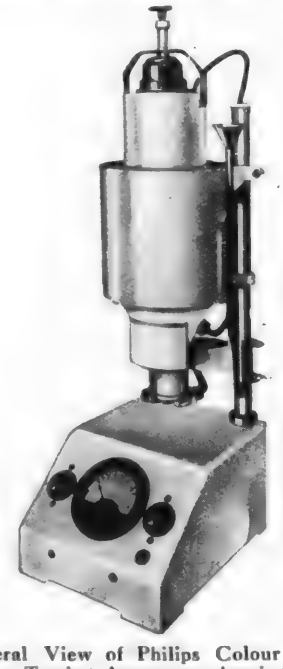
They have been tested under the most dangerous conditions, the wearers entering blazing furnaces and working for some time. Although they were enveloped by flames the men wearing the suits apparently suffered no harm.

Water Treatment

The "Otto" Ozone Water Purification Process is claimed to sterilise, decolorise, and deodorise water and therefore ought to be of considerable interest to canners and food manufacturers generally. That it acts as an oxidising agent will be clear from its name, and as no new chemical is added to the water there is no residue. It should be worth examining. The company offering the process is called the British "Otto" Ozone Water, Wood and Textile Treatment Co., Ltd.

Colour-Testing Apparatus

Philips Industrial have sent us a very full description of their new Colour Constancy Testing Apparatus suitable for paints, lacquers and other materials. Essential features of the apparatus are quick operation and constant source of illumination of the same energy distribution as sunlight, but of a light intensity that is approximately 50 times that of the sun at noon on a fine day at midsummer. Philips Industrial are a branch of Philips Lamps, Ltd.



General View of Philips Colour Constancy Testing Apparatus showing lamp holder, water jackets surrounding reflectors, ammeter indicating lamp current, etc. The centre knobs are for coarse and fine adjustment of lamp current and switch for fan motor.

Devine Process Equipment

The contents of the Condensed General Catalogue No. 105-B of the J. P. Devine Manufacturing Co., Inc., read more like a technical publication than a catalogue. In it will be found illustrations of equipment in the course of construction in their works and of various finished installations, together with a number of drawings and diagrams.

This issue deals with many types of vacuum dryers, open and enclosed flakers, heat exchangers, vacuum pan crystallisers. At the end of the publication is some very useful technical data, including temperature conversion tables, temperature volume charts, and an exceedingly useful evaporation table.

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The new and larger emulsifier, now being manufactured by Messrs. Ormerods, of Rochdale, is nearly completed.

Pumping Problems

The latest booklet issued by Henry Wiggin and Co., Ltd., is entitled *Pump Service and Problems*, and is written by Professor William Kerr, Ph.D., M.I.Mech.E. The pump, says Professor Kerr, may be reckoned the first of the mechanical conceptions "because of the age-old problem of raising water . . . there is a greater historical continuity in pump design than any other branch of the mechanical art".

A pump used in food manufacture with all contacting parts made of Monel metal (by the Albany Engineering Co., Ltd.) is illustrated. When used with fluid foodstuffs of a non-lubricating character, special bushes, which do not require lubrication, may be fitted.

Following Professor Kerr's contribution are tables and data regarding Monel metal equipment, and the properties of the metal, with a series of illustrations of pumps and their parts in different services.

Refrigerator Ships

We are informed by the Brush Electrical Engineering Co., Ltd., that "Brush" oil engines of 300 b.h.p. for driving refrigerator compressors are fitted in the three Blue Star Line ships, *Imperial Star*, *New Zealand Star*, and *Australian Star*, which have been recently completed for service between New Zealand and this country. One of the vessels, the *Imperial Star*, has already made its maiden voyage to New Zealand and back, bringing a cargo of New Zealand lamb, cheese, etc., during which trip the refrigerating machinery was in operation for a total of 44 days, running day and night uninterruptedly.

These vessels, which are described as the most modern food carrying vessels, are fitted with compressors and refrigerating equipment by J. and E. Hall, Ltd., of Dartford, and the Liverpool Refrigeration Co.

Even Fishes Need Refrigeration

An installation of no little interest is being carried out at Blackpool Aquarium for the Blackpool Tower Company. It seems that fishes like their water to be at an even temperature; therefore, in order to gratify this whim (fishes are very temperamental creatures) Messrs. York Shipley, Ltd., are installing a self-contained Freon Unit, which cools the water to the required temperature as it flows from the tanks before it is allowed to return. Some 6,000 gallons per hour are dealt with in this manner, the whole plant being entirely automatic. Freon was chosen as the refrigerant, owing to its non-toxic qualities.

INFORMATION and ADVICE

Peanut Butter—Christmas Pudding—Canned Mushrooms —Various Recipes—Insulating Cold Rooms—Sausages—Drying—Corn Flakes—Biscuit Making—Vegetable Sandwich Spreads—Fish Cakes

Peanut Butter

1,860. *Will you kindly furnish some information on the preparation of peanut butter?* (Holland.)

This is a difficult matter to treat in the course of correspondence, as there are various methods of processing, depending to some extent on the variety of peanut used and the particular type of product aimed at.

The general method of procedure is as follows: The shelled nuts are passed into roasters. The temperature used for roasting is about 320° F., requiring 30 to 40 minutes to complete the operation. A higher temperature is apt to scorch the nuts, which will impart the flavour to the butter, whereas if insufficiently roasted the butter may have a raw taste. The control of roasting is made by noting the colour and texture as well as the ease with which the red skins can be removed. For removing the red skins, germ, stones, and other foreign matter, the cooled nuts are passed through a special machine equipped with brushes which revolve against corrugated plates. This is known as "blanching", and the foreign matter is removed by screening and blowing.

It is important to remove all the skins, as otherwise the butter would be specked and have a bitter taste. The germ is rich in protein and fat; it may be expressed to remove the oil, and the resulting cake may be used for cattle food. If ground into the butter, the germ will impart a bitter flavour and cause rancidity; it should therefore be removed.

After blending, the nuts are carefully picked over a sorting belt and then they are passed to a mechanical stoner to remove any small stones. Grinding is done by passing the nuts through steel discs or granite stones, similar to mustard stones. It is usual to employ a cooling device. A small amount of honey—about 1 per cent.—is sometimes added to the nuts as they are fed into the grinder; this is done to secure a more stable product. Care should be taken to work up the blanched nuts as rapidly as possible so as to retain the roasted flavour and to avoid any staleness or rancidity.

1,861. *Can you give an economic recipe for making a malted milk powder to place on the market at a competitive price?*

Can you give the address of a manufacturer of cheap pictures similar to cigarette cards, but cheaper, to use in toffee product? (Bradford.)

Information was supplied.

Christmas Pudding

1,862. *Could you please supply, or publish, recipes for manufacture of Christmas pudding?* (England.)

We are quoting a commercial recipe for a Christmas pudding which appeared in our December, 1933, issue, and this will serve as a base for your experiments. Most manufacturers develop their own recipe, which must obviously depend on local taste, price, etc.

Bread	20 lb.
Currants	24 ,,
Raisins (seedless)	16 ,,
Lemon cut peel	2 ,,
Orange cut peel	2 ,,
Citron cut peel	1 ,,
Eggs (well beaten)	100 ,,
Butter	8 ,,
Sugar	12 ,,
Nutmeg (ground)	5 oz.
Ginger (ground)	1½ ,,
Essence of lemon	¾ fl. oz.
Brandy	1 pint

Soak the loaves of bread in 9 quarts of milk overnight. Then pass twice through a mincing machine and mix well with the other ingredients. Fill into 1-lb. basins (this makes 124 basins), put into boiling water, and boil for 5 hours.

It is important to press the pudding well down into the basin and to immerse it in the water which is boiling. Maintain the level of the water by addition of boiling water. Remove the cloth in which the pudding is boiled and wrap it for sale in a clean cloth. If a number of puddings are being boiled in their cloths (without basins) they should be suspended in the tank of boiling water so as not to touch one another.

We have likewise previously published information on mincemeat.

Canned Mushrooms

1,863. *We have read with interest the remarks concerning canned mushrooms in "Food Industries Manual", and we would like to know whether any deviation from the method described is necessary when the pack is intended for export to the British Colonies. Also, what type and size of can would you recommend for this market?* (England.)

The method for canning mushrooms given in the *Food Industries Manual* is quite satisfactory whether the product is intended for use in this country or in the Colonies. There are, however, one or two other methods of packing mushrooms, and no doubt the Campden Research Station could arrange to put up alternative packs for you, so that you could decide which type of product is most suitable. Plain cans are used for mushrooms, and we think the sizes A1 and A1 Tall would be best.

Various Recipes

1,864. *We would esteem it a favour if you could forward recipes for a good Worcestershire sauce, salad dressing, mayonnaise, and meat and fish pastes.* (Australia.)

We are afraid that it is very unsatisfactory making an attempt to give information in the course of a letter on these matters, as there are so many different types of products that it is largely a matter for the individual to develop his own recipes from general information and experience according to local requirements as to price, taste, and so on, as well as taking into consideration the availability of the raw materials.

As a matter of fact, we have had articles on all these subjects—namely, "The Manufacture of Sauces", March, 1933; "Meat and Fish Pastes", June and July, 1933; "The Manufacture of Mayonnaise in the U.S.A.", May, 1933—and it is to these articles that we would refer you for general guidance.

You will realise that it is impossible to go thoroughly into this matter from a manufacturing standpoint in the course of correspondence, and, furthermore, we get so many enquiries each day on all manner of subjects from our readers that we find it possible only to deal with one question from each reader.

1,865. *We would esteem it a favour if you could give us a good dried herb mixture which we could sell as mixed herbs.*

These are required for culinary purposes, and as we pack a variety such as sage, thyme, mint, and parsley we were anxious to get hold of what might be regarded as a satisfactory mixture of herbs which we could put in our packets and correctly call mixed herbs.

We have been buying mixed herbs, but from time to time we run out, and if we knew how to make up our own mixture it would be of considerable help to us. (Dublin.)

A recipe was supplied.

Insulating Cold Rooms

1,866. *It is my intention to build a cold room in connection with my dairy, with a brine tank inside the room, for the double purpose of cooling the room and cooling the milk through a milk cooler, and as this cold room has to be built in between cement walls forming the outside of the room I shall be pleased to know if granulated cork is a good insulating material. I know that at the present cork slabs are used for the purpose of insulating the cold stores, but in my case I think it will be better to have the granulated cork, as the slabs would be rather difficult to get in between the cold room casing and the outer cement walls. I can allow a space of 6" to 8" between the wood casing and cement walls. The floor I could fill in with the cork slabs, say, 4" thick, with a cement finish for the floor in the room.*

I shall be pleased to know if all this will make a first-class cold store if properly carried out. (Yorkshire.)

Granulated cork should form a very good insulating material. An excellent insulator is a finely granulated cork after baking to a dark brown colour. This improves the insulation of the cork by about 13 per cent.

The finely granulated material is better than coarsely granulated, since the latter permits convection currents between granules.

There are other materials which are worth considering, such as cork wool, which must, of course, be protected from moisture, and cellular expanded rubber.

You will get a good deal of information on this subject of insulators from special report number 35 of the Food Investigation Board, and also from the firms who supply insulating materials.

1,867. *We would appreciate it if you could put us in touch with someone who could supply us with a port wine yeast culture.* (Kingston, Jamaica.)

We would suggest you get in touch with the Lister Institute of Preventive Medicine, Chelsea Bridge Road, London, S.W.

Sausages

1,868. *Will you please give me recipes for making pork and beef sausages?* (London.)

With regard to your enquiry on the subject of sausages, there are numerous possible recipes for these products depending on the quality you wish to turn out.

However, as an example we quote the following:

Beef Sausages.

Lean meat	4 lb.
Fat	2 ,,
Binder, dry	1 ,,
Water	1 lb. 6 oz.
Salt	2 oz.
Pepper	¾ ,,
Coriander	¼ ,,
Ginger	⅛ ,,

Pass the lean meat through a fine mincer. Pass fat through a mincer fitted with a plate. Add the seasoning and mix well. Add rusk and finally the fat.

Good Class Pork Sausages.

Lean pork	4 lb.
Pork fat	2 ,,
Rusks	2 ,,
Water	2¾ ,,
Salt	2 oz.
White ground pepper	½ ,,
Mace	½ ,,
Ginger	¼ ,,
Ground sage	¼ ,,

Cheap Pork Sausages.

Lean pork	4 lb.
Fat	2 ,,
Ground rice	4 ,,
Stock seasoning	3 oz.

Pass meat through a mincer, place in bowl chopper, add seasoning, add fat, and then binder soaked in water.

1,869. *Please indicate a source of supply of soya bean flour.* (Singapore.)

This was done.

Drying

1,870. *As subscribers to* FOOD MANUFACTURE *we would like to know if you can give us any information regarding the drying of ingredients for baking and egg powders. We would like to know what you would consider the most suitable way of drying these ingredients, and the temperature to which they could be normally subjected. We realise that it is absolutely essential for all the ingredients of baking powder to be perfectly dry, and have been wondering as to the best method how to arrive at this result.* (Wales.)

Baking powder ingredients are probably best dried at about 110° to 115° F.

This is usually done by spreading out the ingredients on trays, such as wooden or stainless steel trays, placing them on racks in a drying-room or special drying cabinet, heated and ventilated in the usual manner. The time of drying will, of course, depend on the arrangement of heating and ventilating elements. If you have a fan to supply the air or have controllable ventilation you will naturally get quicker drying than by simply depending on natural circulation and steam pipes. The material should be turned over occasionally.

On the other hand, sacks of the materials may be stored in a dry-room immediately on receipt for several months until they attain the same drying conditions. Before use, the materials will require to be broken down and sieved.

As regards egg substitute powders, if you are referring to albumen, the temperature of drying is about the same. It should not exceed 120° F., otherwise there is the danger of coagulation. Arrangements for drying depend on the scale in which it is to be carried out. It might be done in trays as instanced above, but in modern factories it is done by spreading on belts which pass through a chamber which is supplied with heated air and means for its circulation over the surface of the belt.

The albumen is removed from the belt by a knife and is thus produced in flake form. Albumen is also dried by the spraying process. This, of course, involves considerable capital outlay.

Prime quality albumen should not contain more than 14 per cent. moisture. The moisture content actually seems to vary between about 13 and 19 per cent. We believe the Chamber of Commerce rules for trading in dried albumen fix the maximum at 17 per cent., while the London Importers' decision was 19 per cent.

1,871. *Please tell me how to manufacture jellies from agar-agar.* (Cape Town.)

This information was supplied.

Corn Flakes

1,872. *Will you please furnish us with particulars as to the manufacture of the enclosed sample of corn flakes?* (London.)

You require a food technologist on this job if you are going into the matter seriously. He would have to take into consideration all relevant circumstances, such as proposed output, capital outlay, etc., before he could submit a proper report. As regards general information, this lies within our scope, but as this subject of cereal breakfast foods is to be fully dealt with in an article shortly, we would refer you to that unless you have any urgent necessity for information on some specific point.

Biscuit Making

1,873. *As subscribers to your magazine* FOOD MANUFACTURE, *we should be obliged if you could let us know what kind of fat is used in biscuit making.* (Cheshire.)

This enquiry, together with a number of suggestions, was published in the last issue, but our attention has been drawn to the fact that large quantities of oleo oil are imported into this country from both North and South America and incorporated into biscuits.

Vegetable Sandwich Spreads

1,874. *Many thanks for the recipe which you were kind enough to give us. Now we are specially in the manufacture of vegetable sandwich spreads. So if you could give us one or more formulæ for these we should be much obliged.* (Holland.)

General information and an example recipe were furnished.

1,875. *Clients of ours in Jamaica inform us that you had given them the name of the Lister Institute, Chelsea Bridge Road, for the supply of* Port Wine Yeast Cultures. *We have been in touch with this institute, but they tell us that they are not in a position to supply these cultures. If, therefore, you can give us any other address where we could obtain them we shall be greatly obliged.* (London.)

Further suggestions were made.

1,876. *Could you give us some information on the procedure, methods, and plant in common use in this country for shredding suet?* (London.)

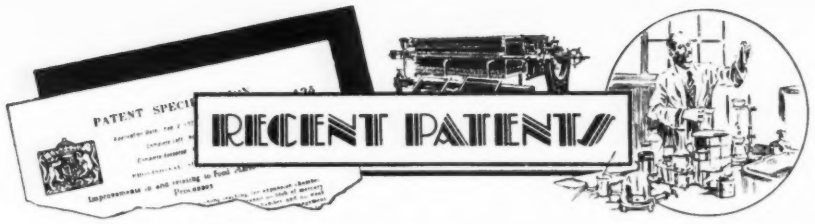
An outline of the process was given.

Fish Cakes

1,877. *I shall be pleased if you can give me a good mix for fish cakes on a large scale without using any potatoes.* (Grimsby.)

We do not see how you are going to make fish cakes without some binder. The commonest is, of course, potato flour, and if you do not use this it seems that there is only the possibility of using rice flour or some other cereal flour. Then again, one uses a certain proportion of beef fat and chopped onions, together with spices, as additional ingredients.

Possibly someone among our readers would oblige us with advice on this point?



These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

10553. BEECH'S CHOCOLATES, LTD., and COLLINSON, E. W.: Sweetmeats. April 5.
10604. EFFRONT, I. A., and POPPER, A.: Manufacture of yeast. April 5. (France, April 7, 1934.)
11003. FRITSCHE, E.: Making baked goods for diabetics. April 9.
11201. SMITH, C. A.: Sugar-cane reducer. April 11.
11288. AKTIESELSKABET DANSK GAERINGS-INDUSTRIE: Process for improving baking strength of flour. April 11. (Denmark, March 29.)
11343. PAYNE, D. M.: Food-straining appliance. April 12.
11466. BROCKWAY, E. J., and CO-OPERATIVE WHOLESALE SOCIETY, LTD., and THOMPSON, M.: Apparatus for roasting coffee beans. April 13.
11547. GUINNESS, SON AND CO., LTD., A., and MILLAR, J. H.: Preparing soluble food extract from brewers' yeast. April 15.
11696. THOMAS, H.: Sharpening knives of slicing machines. April 16.
11726. POMIERANIEC, I.: Fruit-juice extractors. April 16.
11874. DEUTSCHE SOJAWERKE GES.: Producing malt. April 17.
12045. MERKEL, H.: Making coffee infusions digestible. April 18.
12106. WEISSENBERG, H.: Producing butter, etc. April 23.
12145. PRESTAGE, E.: Milk-pasteurising, etc., units. April 23.
12212. HALL, LTD., J. AND E., and FARMER, J. D.: Conditioning perishable goods. April 23.
12274. HETTINGER, V.: Cooking foodstuffs. April 23.
12364. THOMPSON, G.: Boilers for supplying hot beverages. April 24.
12470. REDDIE, L. N. (VOGT PROCESSES, INC.): Treatment of ice-cream, etc. April 25.
12517. THOMPSON, J.: Bread cutting and buttering machines. April 26.
12974. ALLOO, W.: Food-slicing, etc., machines. May 1.
12975. ALLOO, W.: Food-slicing, etc., machines. May 1. (Cognate with 12974.)
13319. FRIEND, R.: Vegetable, etc., peeler. May 4.
13398. DOBSON AND SONS, T. F., and DOBSON, J. S., and DOBSON, F. M.: Bread-slicing machines. May 7.
13424. NICORESTI, C. A. COFMAN: Preservation of edible fungi. May 7.
13578. IREKS AKT.-GES.: Production of preparations for nutritive purposes. May 8.

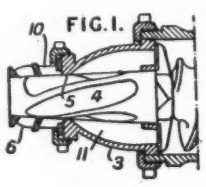
Complete Specifications Accepted

426,357. NYGAARD, J. O.: Method of producing meat extract from whales, seals, and other mammiferous sea animals.
426,541. BOGGILD, C. B. K., and JACOBSEN, M. (trading as Boggild and Jacobsen): Treatment of chocolate and like masses.
426,624. SEARLE, R., and THOMPSON, C. G.: Apparatus for the manufacture, hardening, and storing of ice-cream.
426,729. WAHL, M.: Manufacture of beverages.
426,857. BENZ, J., and HILGERS, W. (trading as Benz and Hilgers): Semi-automatic machine for moulding and wrapping soft masses, especially butter. July 27, 1933.
426,974. HARTMANN, C. W., and HANSEN, A.: Machine for moulding butter or the like. December 21, 1932.
427,177. WALTERSPIEL, A.: Device for roasting and baking food.
427,455. NYGAARD, J. O.: Method of producing meat extract from whales, seals, and other mammiferous sea animals. (Divided out of 29449/33.) (Addition to 29449/33.) (Convention date not granted.)
427,620. BRITISH THOMSON-HOUSTON CO., LTD.: Refrigerated food cabinets. (January 6, 1934.)
427,677. POTTS, H. E. (CONTINENTAL CAN CO., INC.): Preparation of spice or other vegetable flavouring products.

Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.

423,651. **Mincing machines.** SCHOLTES, J., 244, Münsterstrasse, Düsseldorf, Germany. (Divided out of and addition to 420,724.) (Group VI.)



In a mincing machine the material, after a preliminary cutting, is passed between a rotary axial cutter 4 and a stationary sleeve cutter 3 having knives 11, and is then constrained, by a constriction 5 and deep bays in the flutings of the cutter 4, to pass in undulatory manner to a stationary removable "knife basket" 6 which effects the final comminution. The "knife basket" 6 consists of knives 10 arranged longitudinally or substantially longitudinally of the machine, and tangentially to the cutter 4. The knives 10 are spaced by conical disc cutters or hoops. The spacing of the knives in the basket 6 determines the fineness of the mincing, and baskets having different spacings may be provided, so that one may be selected and attached to the machine.

425,567. **Hæmoglobin product for colouring foodstuffs.** H. E. ALLEN and A. G. MCCALEB, 2916, Grant Street, Evanston, Illinois, U.S.A.
A process is specified for the isolation from blood of nitrosohæmoglobin and for its use as a bright red colouring agent for sausages and other meat products. *Example:* 100 lb. fresh warm blood are mixed with 5 oz. of a mixture comprising sodium nitrite (5 per cent.), sodium nitrate ($1\frac{2}{3}$ per cent.), and sodium chloride ($93\frac{1}{3}$ per cent.). After thoroughly agitating for ten minutes the product is allowed to stand for two hours at 70° F. and then cooled to 36° to 42° F. After standing for some time at the latter temperature a bright red colour develops (usually after twenty-four to forty-eight hours). Dehydration is effected by evaporation in a vacuum pan or by spraying into a hot-air chamber, and the product finally ground to powder.

425,863. **Chocolate and sweetmeat mass refining apparatus.** A. BECK, Langer Stieg, 1, Wernigerode, Germany.
Generation of aroma in chocolate or sweetmeat masses is encouraged by bringing the particles into contact with a copious air supply in a special apparatus. This treatment is preceded by a hot-air stream to extract the water, the aroma generation being effected by a cold-air stream. Liquid chocolate mass from a storage tank is received on to a rotating worm in a housing provided with heating and cooling equipment. A blower is arranged above a distributing duct (connected with the worm housing by a pipe), which is fitted at the underside to a drum mounted to rotate over the tank. The horizontal wall of the duct fits closely to the periphery of the drum and acts as a stripper, while the space between the vertical wall and the drum can be altered as desired. A continuous stream of air is allowed to impinge on to the thin moving layer of chocolate mass on the drum circumference. (Convention date, Germany, January 19, 1934.)

425,905. **Fruit glazing process.** BRAMIGK AND CO., LTD., 15, Cree Church Lane, London, E.C. 3.
According to this process a concentrated glazing sugar solution is granulated for deposit on the fruits by mechanically coating the hot solution on the wall of a pan containing the fruit steeping solution and simultaneously cooling the wall. By means of a mechanical device the granulated sugar is forced into contact with and between the fruit. The special apparatus described consists of a steam-jacketed pan in which the sugar solution is adjusted to the desired concentration and a second jacketed pan to which the fruits are transferred (after preliminary treatment in the first pan with sugar by the method specified in E.P. 397,196), and which is equipped with means for mechanically coating the solution on its wall and for simultaneously cooling the wall.

RECENT TRADE MARKS

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

ADSUM.—558,476. **Flour.** S. P. Mumford and Co., Ltd., Bankside House, Leadenhall Street, London, E.C. 3. April 24. (By Consent.)

ATHLETE. — 558,507. **Flour.** Samuel Kidd and Co., Ltd., Bankside House, Leadenhall Street, London, E.C. 3. April 24.

B. F. M.—556,784. **Flour.** Brooks Flour Millers, Ltd., Mistley, Manningtree, Essex. May 1.

Registration of this trade mark shall give no right to the exclusive use of the device of a sheaf of wheat.

BROWNIE.—557,358. **Canned fruit.** The firm trading as James Morton and Co., 52, St. Enoch Square, Glasgow. May 8.

CALIPH. — 556,020. **Canned grapefruit, canned apricots, canned pears, canned peaches, canned pineapple, and canned fruit salad.**

Alfred Wargent Ross, trading as A. W. Ross, 37, Eastcheap, London, E.C. 3. May 1. (By Consent.)

CAMEO.—558,070. **Cakes and biscuits.** George Kemp, Ltd., North Circular Road, Cricklewood, London, N.W. 2. May 1. (By Consent.)

DAGRO.—555,451. **Meat extract and beef soup.** Albert Harald Vilén, Nybrokajen 7, Stockholm, Sweden. May 8.

FARNE BRAND RICH THICK IRISH CREAM.—B 553,546. **Canned cream.** The Shields Ice and Cold Storage Co., Ltd., trading also as Tyne Brand Products, The Shields Preserving Works, Fish Quay, North Shields. May 8.

User claimed from July 1, 1931.

The Applicants undertake that this mark, when registered, and the marks Nos. 338,777 (1772), 391,996 (2358), 553,547 (not yet advertised), 553,548 (2980), and 553,549 (not yet advertised) shall be assigned or transmitted only as a whole and not separately.

FARNE BRAND CHICKEN, HAM, AND TONGUE PASTE.—B 553,548. **Chicken, ham, and tongue paste, being canned goods.** The Shields Ice and Cold Storage Co., Ltd., The Shields Preserving Works, Fish Quay, North Shields. May 8.

User claimed from February 1, 1929.

The Applicants undertake that this mark, when registered, and the marks Nos. 338,777 (1772), 391,996 (2358), 553,547 (not yet advertised), 553,546 (2980), and 553,549 (not yet advertised) shall be assigned or transmitted only as a whole and not separately.

FLETT'S SELECTED FRESH FRUIT.—543,306. **Marmalade.** W. H. Flett, Ltd., Alvina Works, 5, Everton Valley, Liverpool, 4. May 15. (Associated.)

Registration of this trade mark shall give no right to the exclusive use of the word "Flett's" or of the devices of oranges.

GOLDEN ELF.—557,359. **Canned Australian fruit and canned Singapore pineapple.** The firm trading as James Morton and Company, 52, St. Enoch Square, Glasgow. May 1. (By Consent.)

HOMELAND ENGLISH MILK.—558,708. **Condensed sweetened machine skimmed milk.** Wilts United Dairies, Ltd., Bythesea Road, Trowbridge, Wiltshire. April 24. (Associated.)

Registration of this trade mark shall give no right to the exclusive use of the devices of cows or of a pastoral scene.

JUBILADE.—558,472. **Marmalade.** Lindsay Holden Clark, 126, Tankerville Drive, Leigh-on-Sea, Essex. May 1. (By Consent.)

MOONSTONE SPECIALITIES.—557,436. **All goods in Class 42, which includes substances used as food or as ingredients in food, but not including cocoa, chocolate, or confectionery, and not including any goods of a like kind to any of these excluded goods.**

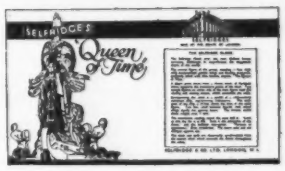
George and John Nickson and Co., Ltd., 25, Victoria Street, Liverpool; 22, 24, and 26, Stanley Street, Liverpool; 12, Grist Street, Liverpool; and 57, Tooley Street, London, S.E. 1. May 15. (Associated.)

ROSE OF TORRIDGE.—558,270. **Butter, cream, cheese, condensed milk, powdered milk (for food), honey, lemon curd, potted meats, meat pastes, chutney, and sauces.** Cow and Gate, Ltd., Cow and Gate House, Stoke Road, Guildford, Surrey. April 24.

The applicants undertake to use the mark only on goods produced in the Valley of the River Torridge, Devon.

ROXY.—559,108. **Tinned salmon.** Charles William Wimbury, 13, Havelock Road, Croydon, Surrey. May 1.

SELFRIDGE'S "QUEEN OF TIME".—558,436. **Substances used as food or as ingredients in food.** Selfridge and Co.,



Ltd., 400, Oxford Street, London, W. 1. May 8.

Registration of this trade mark shall give no right to the exclusive use of the word "Selfridge's".

SIMPLE SIMON. — 558,891. **Self-raising flour.** John Crampton and Co., Ltd., 31 to 33, Princess Street, Chester Road, Manchester, S.W. May 15. (By Consent.)

557,582. **Fruit syrups (not alcoholic and not medicated).**

G. and P. Barrie, Ltd., 191, Albert Street, Dundee, Angus, Scotland. May 15.

STADIUM. — 558,925. **Flour.** Cannon and Gaze, Ltd., Bankside House, Leadenhall Street, London, E.C. 3. April 24.

The above-mentioned goods and goods of a like kind will be struck out from the goods of Registration No. 305,288 (1591) if and before the applicants' mark is registered.

SUMMIT.—553,724. **Lard (for food).**—The firm trading as R. McCracken and Son, 75a, Chichester Street, Belfast, Northern Ireland. May 1.

SUNNY JIM.—555,590. **Substances used as food or as ingredients in food.**

Hecker-H-O Company of Canada, Ltd., Ayr, Province of Ontario, Canada. May 1. (Associated.)

SUNNY JIM.—555,591. **Substances used as food or as ingredients in food.**

Hecker-H-O Company of Canada, Ltd., Ayr, Province of Ontario, Canada. May 1. (Associated.)

"THE CHALLENGE" COOKED PEAS.—548,648. **Cooked peas, cooked beetroot, cooked carrots, cooked potatoes, cooked spinach, cooked beans, cooked celery, cooked brussels sprouts, cooked cauliflower, cooked cabbage, cooked asparagus, cooked apples, cooked**

blackcurrants, cooked strawberries, cooked gooseberries, cooked damsons, cooked golden plums, cooked red plums, cooked Victoria plums, cooked loganberries, cooked raspberries, cooked red currants, cooked pears, cooked apple sauce, cooked mint sauce. JOSEPH FARROW AND CO., LTD., Carlton Mills, Fletton Avenue, Peterborough. May 1. (Associated.) (By Consent.)

In use upon goods other than cooked peas the mark will be varied by the substitution of the name of such goods for the works "Cooked Peas".

VIOROID BREAD. — 558,535. **Bread, cakes, and biscuits, containing ingredients which have been treated with ultra-violet rays.** VIOROID, LTD., 48, Corporation Street, Birmingham, 2. May 1. (Associated.)

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the devices of a loaf and slices of bread.

WHITE-GOLD.—556,655. **Flour.** SPILLERS, LTD., 40, St. Mary Axe, London, E.C. 3. May 15.

The trade mark is limited to the words "White-Gold", and its registration is not to prevent any persons from using the colours white and gold in marking their goods.

WINSHIP'S PREPARED COFFEE.—

559,240. **Prepared coffee in liquid form.** WILLIAM WINSHIP AND CO., LTD., 82, Warrington Road, Newcastle-upon-Tyne. May 15.

Registration of this trade mark shall give no right to the exclusive use of the word "Winship's".

YE OLDE WESTWAY.—558,878. **All goods in Class 42, which includes substances used as food or as ingredients in food.** The firm trading as SYDNEY W. BUSH AND SON, West Gate, Bath. May 1.

YORKSHIRE LASS.—558,672. **Butter, cream, cheese, and condensed milk.** COW AND GATE, LTD., Cow and Gate House, Stoke Road, Guildford, Surrey. May 8.

The applicants undertake to use the mark only on goods produced in Yorkshire.

558,746. **Dried peas in packets and canned English peas, all for sale retail in the United Kingdom of Great Britain and Northern Ireland.** WILLER AND RILEY (1910), LTD., 54, Corporation Street, Manchester, 4. April 24.

NEW COMPANIES

AUTHERS DEVON CONFECTIONS, LIMITED. To carry on the bus. of mnfrs. of and dlrs. in confectionery, etc. Nom. Cap.: £2,500. Dirs.: P. H. Ainsworth, Bolealler House, Cullompton, Devon; B. S. Authers, 3, Taw Vale, Crediton, Devon; E. N. G. Arkell, Lynfield, Shaftesbury, Dorset.

BOLEYN ELECTRIC BAKERY, LIMITED. 292, High Holborn, W.C. To carry on the bus. of bakers, etc. Nom. Cap.: £200.

H. BENTON, LIMITED. To take over the bus. of bakers and confectioners cd. on at 522, Bearwood Road, Smethwick, Staffs, as "H. Benton". Nom. Cap.: £20. Subscribers: F. Haughton and O. H. Smith, 6a, North Parade, Bath.

HUMBLE AND TATE, LIMITED. To carry on the bus. of mnfrs. of and dlrs. in sauces, pickles, etc. Nom. Cap.: £750. Dirs.: J. Humble, 64, General Graham Street, Sunderland; Mrs. J. A. Humble, 64, General Graham Street, Sunderland.

H. WILSON, LIMITED. 74, Cheapside, E.C. To take over the bus. of a baker, etc., cd. on by H. H. Wilson at 93, Fairfax Road, South Hampstead. Nom. Cap.: £2,000.

J. B. GREGORY, LIMITED. 1, Hinde House Lane, Sheffield. To take over the bus. of a baker and confectioner cd. on by J. Gregory in Sheffield. Nom. Cap.: £1,500.

JOHN NICKS, LIMITED. 138-142, George Street, Coventry. To take over the bus. of a baker and confectioner carried on by J. V. B. Nicks at Coventry. Nom. Cap.: £15,000.

JOSEPH BELLAMY AND SONS, LIMITED. To take over the bus. of mnfg. confectioners, etc., cd. on by the private company of Joseph Bellamy and Sons, Ltd., at Wheldale Mills, Castleford, Yorks, and elsewhere. Nom. Cap.: £120,000. Dirs.: H. H. Bellamy, Laurence House, Woodlesford, near Leeds; A. Bellamy, Moor Lodge, Alwoodley, Leeds; Mrs. E. Pennington, Lincombe, Ferrybridge Road, Castleford; H. Bellamy, Moorville, Halcyon Hill, Chapeltown Road, Leeds, 7; F. N. Hargreaves, 1, South View, Collingham, near Leeds; C. J. F. Atkinson, Birchgarth, Burley-in-Wharfedale, Leeds; R. E. Starkie, The Beeches, Ancaster Road, Headingley.

NU-CREAM, LIMITED. 18, Essex Street, Strand, W.C. 2. To carry on the bus. of mnfrs. of and dlrs. in cream, etc. Nom. Cap.: £4,000.

PARKIN PROPRIETARIES, LIMITED. 5, Wine Office Court, E.C. 4. To carry on the bus. of mnfrs. and distributors of foodstuffs, etc. Nom. Cap.: £200.

PITCHFORD AND SON, LIMITED. To carry on the bus. of food mnfrs., bacon curers, etc. Nom. Cap.: £100. Dirs.: J. B. Pitchford, 14, Clytha Square, Newport, Mon.; Mrs. E. M. Pitchford, 14, Clytha Square, Newport, Mon.; E. Pitchford, 14, Clytha Square, Newport, Mon.; Jean Pitchford, 14, Clytha Square, Newport, Mon.

S. J. PRODUCTS, LIMITED. Jubilee Works, Arragon Road, East Ham. To carry on the bus. of mnfrs. of and dlrs. in meats and other foods, etc. Nom. Cap.: £600.

W. F. WICKS AND SON, LIMITED. To carry on the bus. of wholesale, retail, and mnfg. confectioners, etc. Nom. Cap.: £4,000. Permt. dirs.: W. F. Wicks, 35, Holloway Road, N. 7; A. W. J. Wicks, 23, Manor Court, Aylmer Road, N. 2.

WILL HOCKNEY AND SONS, LIMITED. 34, Bark Street, Cleethorpes, Lincs. To carry on the bus. of bakers and confectioners, etc. Nom. Cap.: £2,000.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.

Amalgamation of Newton Chambers & Co., Ltd., and L. C. Engineering Supplies, Ltd.

A DEVELOPMENT of great interest to the Canning Trade and one which may have a considerable influence on the manufacturing practice in the Canning Industry in the future has just taken place. Newton Chambers and Co., Ltd., the well-known Sheffield engineering firm, have been interested for some time in the experimental progress made by L.C. Engineering Supplies, Ltd., with their automatic pressure cooker and cooling conveyors, and, convinced that they have a practical proposition, have come to an arrangement with the manufacturers to undertake the making of the plant at their works at Thorncliffe. They have also taken over the control of the marketing arrangements and the Board of L.C. Engineering Supplies, Ltd., is to be reconstituted.

Canning plant made under the new arrangement will embody all the results of the careful experimental work carried out by the L.C. Engineering organisation. We understand that machines will be ready for delivery in reasonable numbers at the end of this year, and that they will carry the guarantee of efficiency, quality, and service of the sales associated with the name of Newton Chambers.